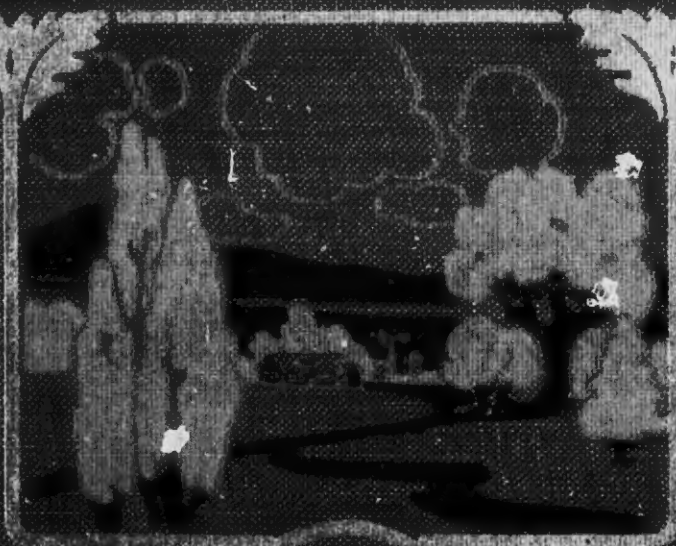


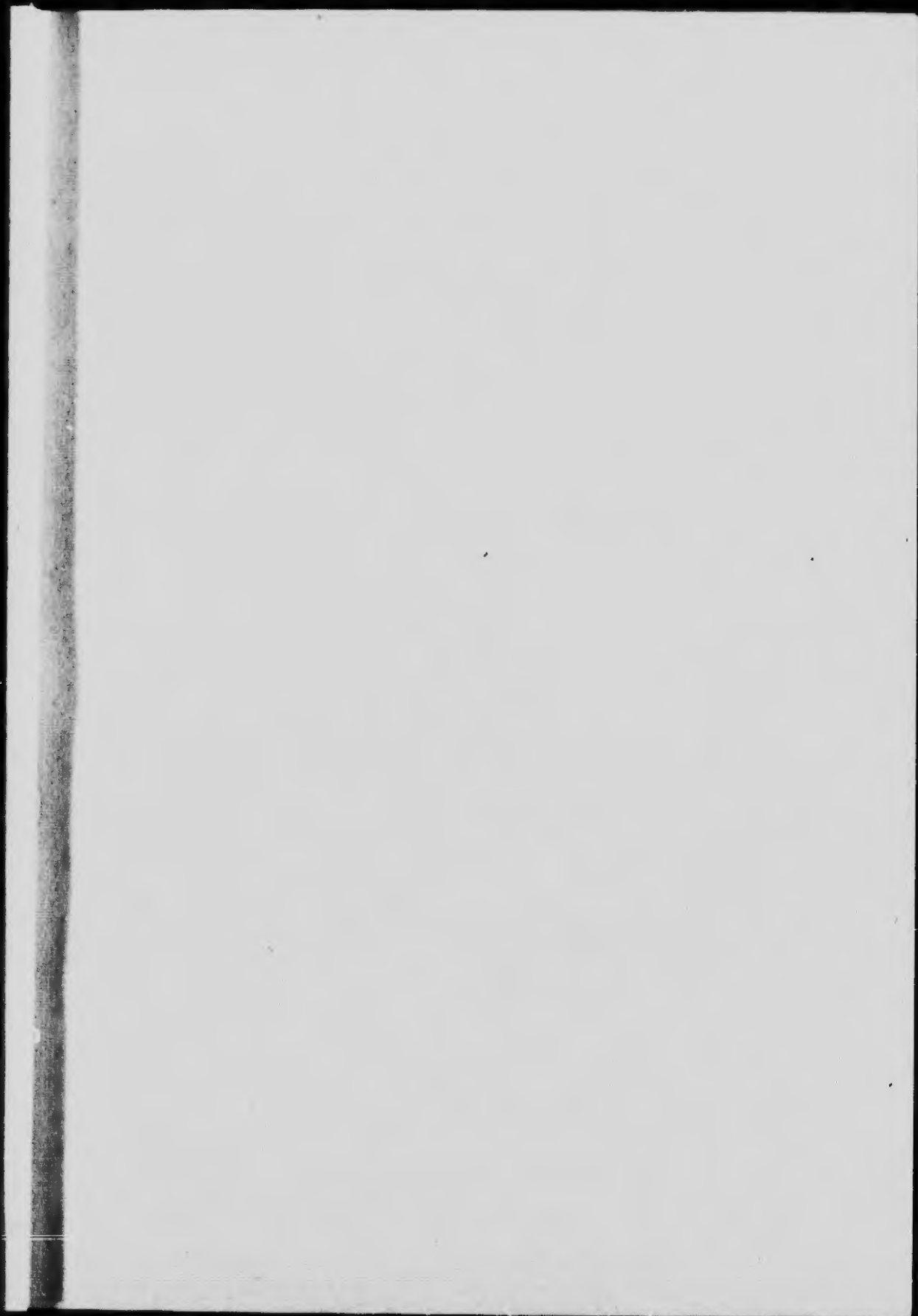
MAKING MONEY FROM THE SOIL

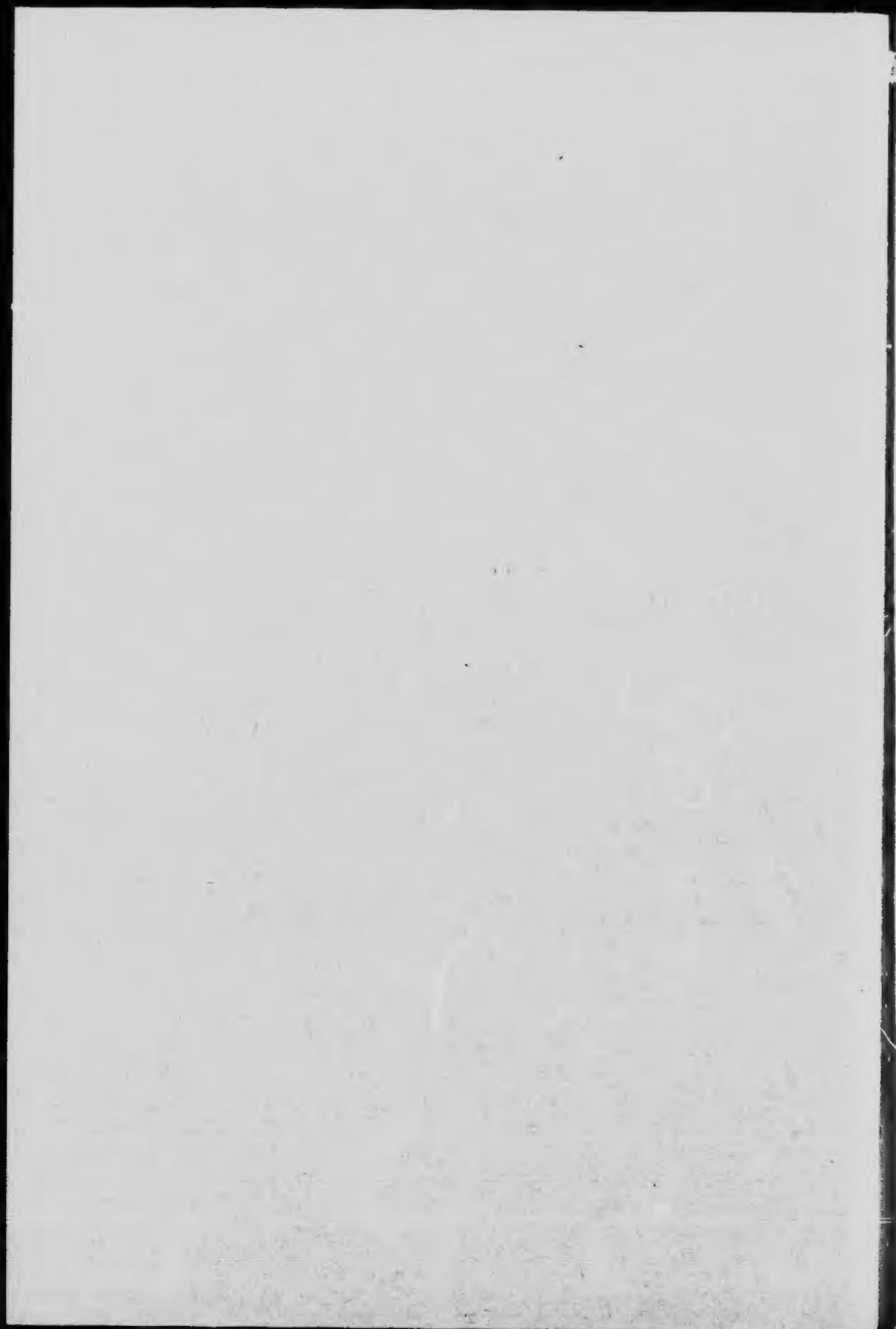


The OPEN DOOR *to*
INDEPENDENCE

WHAT TO DO — HOW TO DO

ON CITY LOTS
SUBURBAN GROUNDS
COUNTRY FARMS



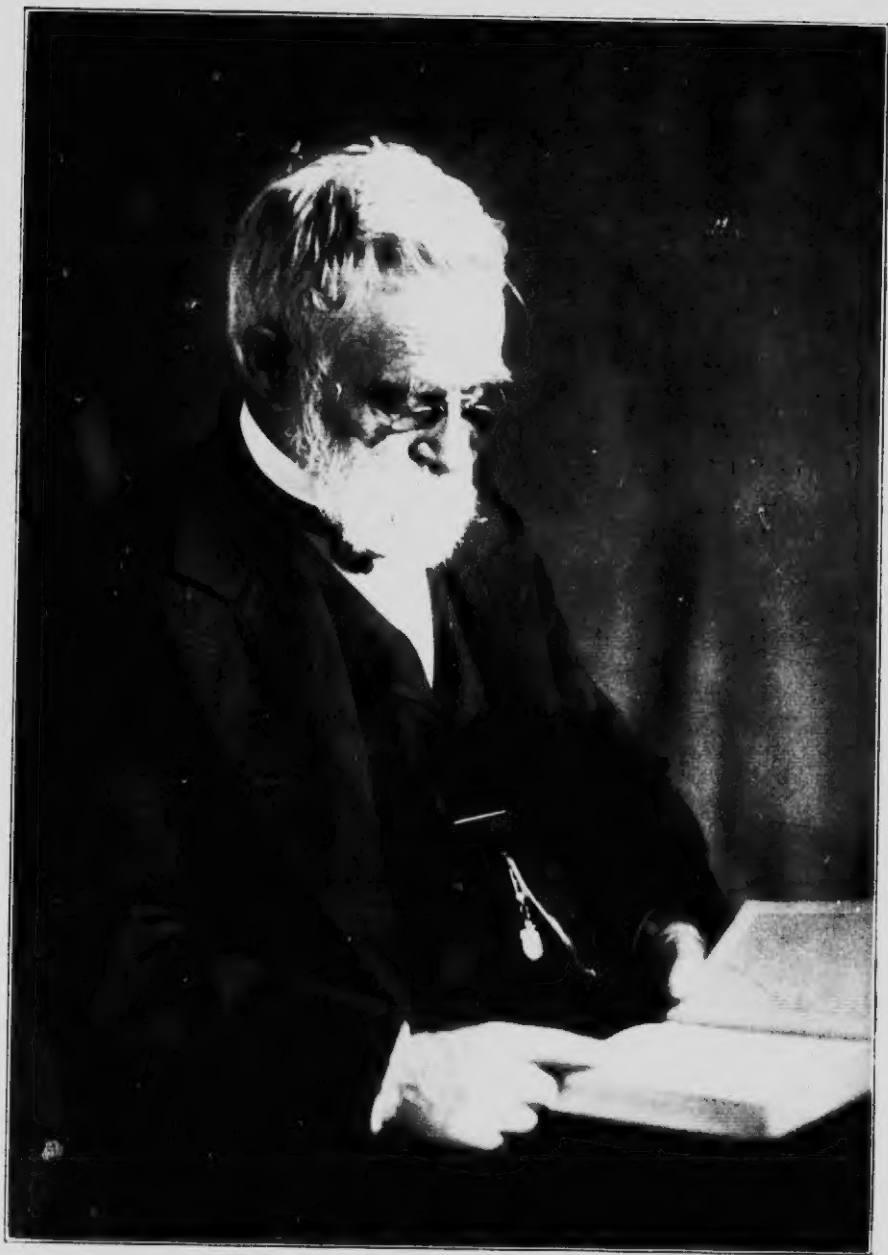


4

BACK TO THE LAND







THOMAS E. HILL

MAKING MONEY FROM THE SOIL

THE OPEN DOOR TO INDEPENDENCE

WHAT TO DO—HOW TO DO
ON CITY LOTS, SUBURBAN
GROUNDS, COUNTRY FARMS

The Provinces of Canada, Counties and Districts,
Cities, Towns and Villages, with Population,
Climate, Soil, Agricultural Produc-
tions and Possibilities

HOW TO FERTILIZE SOIL

Landscape—Beautify—Cultivate—and Successfully Grow Fruits,
Flowers, Vegetables and Grains.

WHILE OBTAINING FOOD AND SUPPORT

How to Have Comfort and Luxury on the Farm, in the Suburb, and on the City Lot

HOW TO CARE FOR DOMESTIC ANIMALS

Sheltering, Feeding, Humanely and Profitably Increasing Breeds and Flocks

By THOMAS E. HILL

Practical Farmer and Scientific Agriculturist; Author of "Hill's Manual," "Hill's Album of
Biography," "Hill's Practical Encyclopedia," Etc.

AND

DONALD G. FRENCH

Author of Report on "The Fruit Belt of Ontario," (as special commissioner for the Colonization
Branch of the Ontario Department of Agriculture, 1910), "Teaching the Farmer How to
Farm," "Prince Edward County" (booklet); special magazine articles on "Farming
as a Science," "Making the Schoolboy a Farmer," "Through Orchard and
Garden in Ontario," etc., etc.

TORONTO
McLEOD & ALLEN

1915

229127

fol.

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ENTERED AT STATIONERS HALL, LONDON, ENGLAND

PREFACE

The purpose of this volume is to enable people to utilize, beautify and enjoy the use and ownership of land. The expression: "Back to the land," does not necessarily mean removing from one location to another, but rather the utilization of land wherever you are—your home garden and grounds, either city, suburb, or your country farm.

This book tells you how to subdue the land, fertilize, plant, cultivate, grow the best fruits and grains; how to use agricultural tools; how to utilize domestic animals, breed flocks, grow flowers, beautify the home surroundings, how to prosper and enjoy rural life.

Within these pages more than one thousand subjects pertaining to farming, gardening, home building and care of domestic animals are treated practically in such plain language that beneficial results are certain to be obtained by all persons who follow directions.

My part in the preparation of this book has been the gathering of information from reliable sources and authorities as to the agricultural industries and possibilities of the various provinces of Canada. You can learn from this volume not only how to go back to the land, but how to choose the location likely to meet your requirements and adapted to the particular branch of agriculture in which you wish to engage.

For material employed in the preparation of my section of this book I desire to acknowledge my indebtedness to reports, bulletins and other literature provided by the Department of the Interior, the respective Provincial Departments of Agriculture and Immigration, and the Dominion Census and Statistics Office; to "The Agricultural Gazette of Canada"; and to the publications issued by the three Canadian transcontinental railway lines.

To Dr. C. C. James, Commissioner of Agricultural Instruction for Canada, I herewith convey my grateful appreciation of his kindness in making many suggestions of value to me in my work.

DONALD G. FRENCH



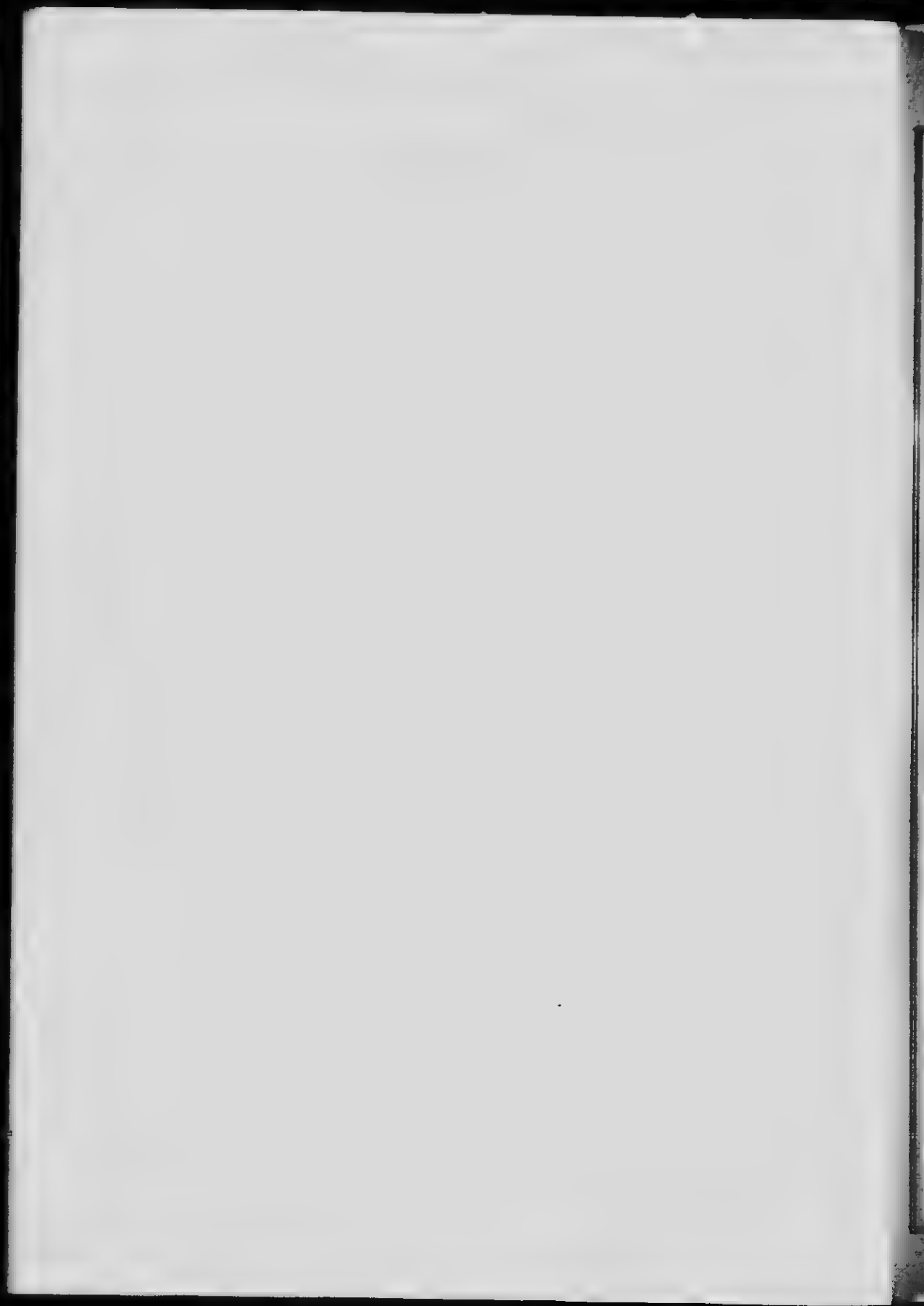
GENERAL INDEX

OF

MAKING MONEY FROM THE SOIL

DETAILED TOPICAL INDEX AND INDEX
TO ILLUSTRATIONS ON PAGES 281-288

	PAGES
Agricultural Opportunities in Canada.....	11-73
Alberta	51
British Columbia	57
Manitoba	43
New Brunswick	20
Nova Scotia	13
Ontario	31
Prince Edward Island.....	11
Quebec	25
Saskatchewan	47
Special Homestead Regulations.....	55
Dominion Spraying Calendar.....	63
Dominion Department of Agriculture.....	68
Points of Interest in North America.....	74
Treatment of Land.....	83
The Vegetable Garden.....	90
How to Grow 100 Varieties of Flowers.....	114
Beautiful Homes	124
Horses	164
Cattle	169
Sheep	176
Swine	180
Poultry	182
Grasses	209
Dogs	210
Domestic Pets	214
Beekeeping	216
Grains	220
Alfalfa and Forage Crops.....	224
Silos	228
Fruit Growing	238
Technical Terms, Dictionary of.....	263
Tools Required by Settlers.....	271
Storage of Farm Products.....	277
<i>Topical Index to All Subjects</i>	281
<i>Index to Illustrations</i>	285



PROVINCE OF PRINCE EDWARD ISLAND

COUNTIES OF PRINCE EDWARD ISLAND	CITIES, TOWNS AND VILLAGES OF PRINCE EDWARD ISLAND	CHARLOTTE-	No. Rustico.....
Population 1911 Census	210 Population of Over 1911 Census	11,198	729
Kings	Abbots Village.....	Tr. VN	Orwell
Prince	Alberton	Colman	Pinette
Queens	Bedeque	Crabaud	Rustico
	Broadbent	Flat River	St. Eleanore
	Caledonia	Georgetown	St. Louis Station
	Cape Tr. Verre	Hunter River	Souris
	Cardigan	Kensington	Suffolk
	Carlton	Kildare	Summerside
	Cavendish	Mill River	Tignish
		Montague	Tryon
		Montrose	Tyne Valley
		Mount Stewart	Valleyfield
		Murray Harbor	Victoria

PROVINCE OF PRINCE EDWARD ISLAND

Area, 1,397,991 Acres. Population, 93,728. Capital, Charlottetown. Lieutenant Governor, Hon. Benjamin Rogers. Premier, Hon. J. A. Matheson

Historical Note

Under the French this was known as Isle St. Jean, having been discovered, some historians say, on St. John's Day, 1497, by Sebastian Cabot. Nothing, however, was done towards settlement until 1715, when the fertility of the soil attracted some Acadians from Cape Breton. The island was ceded to Britain in 1763, when it was annexed to Nova Scotia, but in 1768 it was constituted a separate province. The population at the time of its cession was 4,000, but by immigration and the expulsion of the Acadians it was reduced to about 1,300 in 1768.

In the year 1799 the name was changed from St. John's Island to Prince Edward Island, in honor of the Duke of Kent. The land question was for many years a cause of friction and a hindrance to the progress of the Province. Prior to 1875 most of the land belonged to absentee landlords, but in 1875 the local government bought out these interests and resold to the tenants. Prince Edward Island was admitted into the Dominion in 1873.

Location and Extent: A crescent-shaped island lying in the Gulf of St. Lawrence, 140 miles long, from 2 to 34 miles wide.

Surface and Soil: Described in 1534 by Cartier as "a low and beautiful land," chief elevation a chain of hills crossing it near the middle. Sand dunes encircle and protect the coast. Known as "the garden province," or Canada's "million-acre farm"; 85 per cent of its area is occupied; 80 per cent of population engaged in agriculture. Rich fertilizer, "mussel mud," composed of decayed oyster, clam and mussel shells, is found in most of the bays and rivers.

Climate: Moderated by sea both winter and summer. Ice in surrounding waters delays spring. Summer climate makes it a tourists' paradise. Temperature, average for 20-year period, 40.2; 1914 returns give mean winter temperature 19.9, mean summer 61, lowest -70,

highest 85, hours of sunshine 1,815. Precipitation average for 20-year period, 40.15; 1914 report, 33.70 inches.

Grains and Roots: The chief field crops are hay, oats, wheat and potatoes. Next in importance come roots, mixed grains and barley.

It is what may be called finished products of agriculture—beef, bacon, poultry, butter, cheese and fruit—that are exported from this "million-acre farm" rather than raw materials, such as wheat, hay, oats and potatoes.

Wheat: White Russian is the favorite variety of wheat, with White Fife a close second. Colorado Bearded and White Chaff also grow well.

Oats: Banner is grown almost exclusively in some sections, in others Old Island Black.

Barley: Grown chiefly mixed with oats and peas.

Potatoes: MacIntyres and Dakota Reds are popular.

Clovers: Mammoth, Common Red and Alsike.

Timothy is the chief grass crop.

Live Stock and Poultry

The breeding of live stock is carefully fostered, and cattle, horses and sheep are raised for export to the neighboring provinces. Poultry is raised for the Sydney market.

The live stock of the Province (1914) was: Horses 36,114, value \$4,013,710; milch cows 47,317, value \$1,849,622; other cattle 61,408, value \$1,555,503; sheep 85,351, value \$516,374; swine 41,718, value \$614,913.

Chief breeds of swine are Berkshires and Yorkshires. There are two breeders of Tamworths. Clydesdale horses are bred. Sheep: Shropshire, Leicester, Cotswold, Southdown, Lincoln.

Dairying—46 cheese and butter factories. Annual output of cheese, over \$300,000; butter, \$150,000.

Province of Prince Edward Island

Crop Returns—1914

Spring wheat, 809,000 bus.....	\$ 241,000
Oats, 7,596,000 bus.....	3,646,000
Barley, 119,000 bus.....	76,000
Peas, 3,200 bus.....	6,400
Buckwheat, 86,000 bus.....	60,000
Mixed grains, 360,000 bus.....	202,000
Potatoes, 6,806,000 bus.....	1,565,000
Turnips, mangels, etc., 3,560,000 bus....	783,000
Hay and clover, 334,000 tons.....	4,355,000
Fodder corn, 2,400 tons.....	6,800

Fox Farming: This unique industry has grown very rapidly within the last few years. Total number of foxes, 3,130, on 277 ranches (1913); varieties—Silvers, Crosses, Reds and unclassified. Estimated value of the industry, December 31, 1913, was \$15,186,150. A large and well-equipped fox ranch does not cost over \$5,000.

Other Fur Farming: This industry now includes the rearing of beaver, raccoon, muskrat, Russian sable, fisher, skunk and Karakule sheep, the latter producing the celebrated Persian lamb fur.

Fruit growing is being developed rapidly. The island now produces excellent crops of apples, plums, cherries, pears, and berries.

Apples: Duchess of Oldenburg, Wealthy, Ben Davis, Alexander and Stark.

Fisheries include lobster, cod, smelts, mackerel, oysters. Annual value, about \$1,200,000. The Province has 187 lobster-canning establishments. The famous malpeque oyster, one of the best in the world, is produced here. Many farmers have their own oyster beds. The oyster industry is under supervision of the government and oyster-bed lands are leased by them.

Agricultural Instruction

Elementary: A two weeks' "short course" was held in the summer of 1913 for school teachers: 260 attended. In 1914 a three weeks' course was given, and two-thirds of the teachers in the Province were in attendance. For the guidance of these teachers a well-thought-out course in nature study was drawn up by educational and agricultural experts; and as an encouragement to put forth their best efforts teachers were given an opportunity to win a substantial bonus by doing well the work of the "Rural Science" course. To be entitled to this bonus, a teacher must have a well-kept school garden properly used in the instruction of the pupils and have also five "home projects" being conducted in five different homes. Five additional "home projects" are regarded as equivalent to a school garden, and the more "home projects" successfully conducted the greater the amount of the bonus.

Short Courses are given in agriculture and household science, including animal husbandry, agriculture, poultry husbandry, field crops, seed judging, cooking and household science. Attendance (1913), 460 young men and 70 young women.

Associations: The Province now has a Dairy-men's Association and associations of horse breeders, dairy breeders, beef breeders, sheep breeders.

Exhibitions: Seed fairs, with educational meetings in connection, are held during winter months. Annual attendance, 3,000 to 4,000 farmers. Several county exhibitions and local fairs.

Egg Circles: Seventeen in operation; membership, 600. Demonstration poultry houses in operation in connection with some egg circles.

Farmers' and Women's Institutes: Fifty-two of the former in operation; membership, 2,522; 31 of the latter, with 750 members.

School Gardens, Etc.: At the last meeting of the school inspectors held in 1914, they reported that 115 school gardens had been either established or arrangements have been made to carry them on in 1915. Home projects had been undertaken by 870 pupils, 545 had agreed to grow vegetable seeds, 58 schools had collections of weed seeds, ranging from 5 to 30 varieties; 18 have collections of mounted seeds, and 5 have collections of mounted insects, the greatest number of any one collection being 52.

Long Course in Agriculture: Now given at Charlottetown. Instruction is given in animal husbandry, field husbandry, poultry husbandry, dairying, English, arithmetic, chemistry, horticulture, bookkeeping and civics.

District Representatives: One has been appointed for each county.

General Education: School system is free, non-sectarian, compulsory for ages 8 to 13. Prince of Wales College and Normal School at Charlottetown trains teachers and takes up first part of university work.

Transportation: A railway runs the length of the island; there are ferry connections with the mainland.

How to Get a Farm in Prince Edward Island

This is the only province of Canada in which there are no crown or government lands. Practically the whole area is occupied. Improved farms may be purchased.

Cost of Land: Improved farm lands are for sale; prices vary from \$20 to \$50 an acre, with buildings. Particulars of farms for sale may be had from J. E. B. McCready, Publicity Agent, Charlottetown.

PROVINCE OF NOVA SCOTIA

CITIES OF NOVA SCOTIA

Population—1911 Census

Annapolis	18,581
Antigonish	11,062
Cape Breton and	20,208
No. Victoria	23,332
Cape Breton, S.	23,464
Colchester	20,543
Cumberland	20,167
Digby	17,048
Guysborough	19,704
Halifax (and city)	25,571
Inverness	21,760
Kings	1,858
Lunenburg	11,273
Pictou	24,211
Richmond	23,226
Shelburne & Queens	
Yarmouth	

CITIES, TOWNS AND VILLAGES OF NOVA SCOTIA

Population 100 and Over—1911 Census

Acadiaville	200
Adelaide Harbor	500
Amherst	8,973
Annapolis Royal	1,019
Antigonish	1,797
Apple River	400
Arcadia	300
Arichat	300
Arisaig	200
Aspen	400
Atwood's Brook	200
Auburn	200
Avonport	210
Aylesford	500
Baccaro	200
Baddeck	1,379
Baileys Brook	250
Baker Settlement	200
Balmora Mills	250
Barney's River	400
Barney's River	200
Barrington	700
Barrington Passage	400
Barns' Corners	400
Barton	300
Bass River	300
Baxters Harbor	300
Bayfield	200
Bay St. Lawrence	200
Bear Point	200
Bear River	1,411
Beaulieu	300
Bedford	700
Belle Cote	250
Belle Marche	200
Bellefleur	200
Bellefleur Cove	300
Bellmont	200
Benacadie	500
Berwick	1,000
Big Bras d'or	200
Big Tracadie	250
Bill Town	300
Blandford	300
Blockhouse	700
Blue Mountain	350
Blue Rock	250
Boylston	300
Bridgeport	1,200
Bridgetown	900
Bridgewater	200
Brighton	1,300
Broad Cove	500
Chapel	300
Broad Cove	300
Marsh	300
Brookfield	300

Brooklyn	300
Brook Village	250
Brookville	200
Brule	400
Burnside	250

C

Caledonia	200
Caledonia, Queens	200
Cannes	200
Canning	200
Canso	1,017
Cape Augnet	200
Cape Negro	250
Cape North	250
Cape Sable	200
Island	200
Catalone	200
Central New	200
Annan	200
Centre Burlington	250
Centerville	500
Charles's Cove	200
Chaswood	200
Chelsea	200
Chester	200
Chester Basin	200
Cheverly	200
Chignecto	200
Christmas Island	200
Church Point	200
Clarke's Harbor	1,000
Clementsport	200
Clementsvale	250
Cleveland	200
Clyde River	300
Collingwood Corner	400
Comeauville	200
Corn's Mills	200
Conquerall Banks	225
Cross Roads	200
Country Harbor	250

D

Dalhousie East	250
Dalhousie West	250
Dartmouth	5,058
Deep Brook	400
Denmark	200
Denver	200
Decosse	300
Digby	1,246
Diligent River	200
Doctor's Cove	200
Dominion	2,589
Dominion No. 6	200
Dunvegan	200

E

Earlton	200
East Bay	250
E. Chessetcook	200
Eastern Harbor	1,000
Eastern Passage	250
E. Port Medway	200
E. Publico	200
E. River	200
Eatonville	250
Economy	350
Ecum Secum	250
Eel Brook	200
Elmsdale	400
Enfield	250
English Town	200

F

Fairview Station	250
Falmouth Station	200
First South	250
Five Islands	225
Five Mile River	200
Fourchu	225
Fox River	300
Frankville	200
Freepoint	1,400
French Village	832
Friar's Head	300

G

Gabarouse	1,750
Gabarouse Lake	200
Gay's River	250
Georgville	200
Gilbert Cove	225
Gillie's Point	200
Glace Bay	16,561

Glencoe	620
Glenholme	400
Goldboro	200
Grand Desert	250
Grand Etang	400
Grand Mira No.	200
Grand Narrows	250
Grande Pre	250
Granville Centre	200
Granville Ferry	220
Great Village	1,000
Greenfield	200
Green Harbor	200
Green Hill	200
Groesbeek Coques	500
Guysborough	1,000
Guysborough	200
Intervale	200

H

HALIFAX	44,001
Hammond's Plains	200
Hantsport	650
Harmony Mills	200
Havre Bouchar	700
Hay's River	200
Hazel Hill	450
Head of Jordan	200
River	200
Head of St. Mar-	200
garet's Bay	200
Hatherton	200
H. Iron	500
Herring Cove	225
Hopewell	200
Hortonville	425
Hubbards	450

I

Ingonish	400
Inverness	2,719
Irish Cove	200
Iron Mines	200
Isaac's Harbor	500

J

Jeddore Oyster Ponds	200
Joggins Mines	500
Jordan Branch	250
Judique	300

K

Kemptville	200
Kennetcook Corner	250
Kentville	2,204
Kingsbury	225
Kinsman's Corners	200

L

La Have	200
La Have Island	200
Lake Ainslie	250
Lake Vale	250
L'Ardoise	750
Larry's River	600
Lawrencetown	200
Leitch's Creek	200
Lingan	300
Linwood	200
Liscomb	500
Little Bras d'or	200
(South Side)	200
Little Brook	400
Little Dover	200
Little Lorraine	500
Little Narrows	300
Little River	350
Little River Chet-	500
camp	500
Little River Mus-	550
quodoboit	2,109
Liverpool	200
Lochaber	200
Loch Lomond	250
Lockeport	784
Loganville	250
Londonderry	1,500
Londonderry Station	200
Long Point	200
Louisburg	200
Louisdale	200
Lower Argyle	200
Lower Barney's l	200
Lower E. Publico	200
Lower Economy	200

Lower l'Ardoise	750
Lower Onslow	250
Lower Sackville	200
Lower Sandy Point	250
Lower Melmah	200
Lower Ship	200
Harbor	250
Lower St. Lawrence	400
Lower West	200
Publico	250
Lower Wood	200
Harbor	200
Lunenburg	1,001
Lyns Brook	200

M

McKinnon's Harbor	200
Mabou	600
Mactan	250
Mahone Bay	500
Main-a-Dieu	200
Maitland	200
Maitland, Hants	200
Maplewood	200
Marble Fountain	200
Margaree Harbor	500
Margaretsville	200
Marie Joseph	500
Marion Bridge	250
Marriott's Cove	250
Martin's River	200
Mass Town	250
Maville's	200
Meagher's Grant	250
Melvern Square	400
Merigomish	400
Meteghan	2,400
Meteghan River	400
Meteghan Station	250
Middle La Have Ferry	200
Middle	200
Musquodoboit	1,000
Middleton	827
Milford Station	500
Mill Cove	200
Millville	200
Mill Village	721
Milton	1,100
Minudie	200
Mira Ferry	250
Mira Gut	250
Mochele	200
Moose River	400
Gold Mines	400
Morristown	200
Moser's River	250
Mount Hanly	200
Muirgrave	700
Musquodoboit	1,120

N

Necum Touch	400
Nella Harbor	200
New Aberdeen	600
New Albany	200
New Germany	1,500
New Glasgow	6,383
New Harbor	250
Newport	400
Newport Landing	500
New Waterford	3,000
Nictaux Falls	200
Nine Mile River	200
Noel	200
No. Brookfield	200
No. E. Harbor	250
Northfield	250
No. River	200
No. Salem	200
No. Sydney	5,418

O

Osborne	200
Owl's Head	200
Harbor	200
Oxford	1,449

P

Paradise	250
Parraboro	2,700
Petite de Grat Bridge	350
Petite Riviere Bridge	200
Pictou	3,179
Pleasant Bay	275
Pleasant Harbor	200

Province of Nova Scotia

Pleasant River	250	River Phillip	300	Spring Hill	5,113	Upper Port La Tour	350
Pleasant Valley	450	Riversport	300	Springville	250	Upper Hawdon	300
Point Cross	300	Riverside Corner	250	Spry Bay	300	Upper Stewiacke	350
Portiquaque	300	Rockingham Station	300	Stellarton	1,614		
Port Dufferin	300	Hooklin	250	Stewartdale	300	V	
Port Felix	300	Rockville	300	Stewiack	471	Victoria Beach	300
Port George	300	Rose Bay	350	Summersville	300	Victoria Mines	350
Port Greville	450	Round Hill	300	Sunnybrae	300		
Port Hastings	300			Sydney	17,711	W	
Port Hawkesbury	350			Sydney Mines	4,600		
Port Hillford	300	Sable River	300	Sydney River	300		
Port Hood	300	St. Bernard	300			Waterville	300
Port Joli	300	St. Peter's	300			Wallace	300
Port La Tour	300	Salmon River	1,000			Walton	300
Port Lorne	300	Salt Springs	250	Tacook Island	300	Waterville	300
Port Maitland	975	Sambre	400	Tanger	300	Waverley	300
Port Malcolm	250	Sandford	250	Tatamagouche	300	Wedgeport	1,302
Port Medway	300	Sandy Cove	400	The Falls	300	Wentworth Station	300
Port Morden	300	Sandy Point	300	Thompson's	300	Wentville Lake	300
Portuguese Cove	300	Saultville	400	Station	300	West Bay	300
Port Wade	300	Scotch Village	300	Thorburn	250	Westchester	300
Port Williams	300	Scotts Bay	300	Tidnish	300	West New Annap	300
Poullamond	300	Seabright	250	Tiverton	250	West Newby Quoddy	350
Princeport	300	Seimah	250	Tomkin's Mill	300	Westport	300
Prospect	700	Sheet Harbor	371	Toney Mills	300	West Pubnico	1,300
Publico H.	911	Shelburne	1,431	Torbay	300	West River	300
Pugwash	700	Sherbroke	500	Torbrook Mines	300	West River Station	300
		Shinimecas Bridge	250	Torbrook	300	Westville	4,117
Quinan	300	Shubenacadie	1,475	Trenton	300	Weymouth	300
		Shunacadie	300	Turo	5,107	Weymouth North	300
		Sluice Point	300	Tusket	450	White Rock Mills	300
		Somerses	250	Two Rivers	300	Whycocomagh	400
		Sonora	300			Wilmot	300
Rawdon	250	South Alton	300			Windsor	5,433
Reserve Mines	1,200	Southampton	225	Upper Kennetcook	300	Windsor Jct.	300
River Bourgeois	300	So. Farmington	250	Upper Middleboro	300	Wine Harbor	300
River Dennis	300	So. Maitland	300	Upper Musquodoboit	1,300	Wolfville	1,456
River Dennis Centre	300	So. Ohio	300	Upper New Harbor	300		
River Hebert	400	Springhaven	300	Upper Newport	300	Y	
River John	300					Yarmouth	5,000

PROVINCE OF NOVA SCOTIA

Area, 13,713,771 Acres. Population, 492,338. Capital, Halifax. Lieutenant Governor, Hon. James Drummond McGregor. Premier, Hon. G. H. Murray

Historical Note

Nova Scotia was first visited by Cabot in 1497, but no settlement is recorded until 1498, when the French established Port Royal (now Annapolis), giving the name of "Acadie" to the colony—this name is said to be derived from "Cadie," an Indian word meaning a place of abundance. The colony was for many years the scene of frequent conflicts between the French and the British. It was formally ceded to France by the Treaty of Breda, 1667, but in 1690 was captured by William Phipps. Subsequently it was restored to the French.

The Nova Scotia mainland was finally handed

over to Britain by the Treaty of Utrecht in 1713, but Cape Breton continued for some time longer to be the scene of hostilities between the two powers. Louisburg, the great fortress in Cape Breton, was captured by the British in 1745, but restored three years later.

In 1755 about 6,000 Acadians were expelled from the colony, but many subsequently returned. In 1758 Louisbourg was again taken by the British, and Cape Breton was included in the territory ceded to Britain in 1763. It was afterwards made a separate province but again joined to Nova Scotia in 1819 and with it by the Confederation Act became part of the Dominion.

Physical Features, Soil and Climate

The Province of Nova Scotia forms a peninsula at the eastern extremity of the Dominion of Canada and has an area of 21,427 square miles. Two natural divisions are the Mainland and the Island of Cape Breton. It is connected with New Brunswick by an isthmus thirteen miles in width. Its total length is about 350 miles, while the width varies from 50 to 100 miles. So nearly surrounded by the sea, its bays and harbors are naturally numerous. There are more than a dozen excellent harbors on the coast line, first in importance being Halifax, which embraces

the outer harbor, the Northwest Arm and Bedford Basin. It is celebrated as one of the best in the world. It is easy of access for ships of every class, very capacious and affording protection from every wind. Sydney Harbor is one of the finest and most completely land-locked harbors in America. Other harbors are Louisburg, Merigomish, Pictou, Wallace, Pugwash, Isaac's and Country, Wills, Liscomb, Sheet, Ship and Shelburne.

The bays of Nova Scotia are numerous and spacious. The largest is the Bay of Fundy.

Province of Nova Scotia

whose tides are noted the world over for their great rise and fall. Other bays are St. Margaret's and Mahone, studded with islands and containing many coves. Chester, a beautiful summer resort, is situated on Mahone Bay. Still other bays are St. Mary's and Chedabucto, opening to the Atlantic, and St. George, Tatamagouche and Bay Verte, on the coast of the Gulf of St. Lawrence.

Nova Scotia is pre-eminently a well-watered country. Its rivers are numerous, but owing to the peninsular formation of the country, are necessarily small. The Shubenacadie is the largest. A large number are navigable for a short distance from their mouth.

Surface: The marked inequality in the surface of Nova Scotia has been the cause of the formation of the many lakes scattered over it in every direction. Some of these lakes are extremely beautiful, while the hills that environ them are embellished with the greatest variety of scenery. Most of these lakes abound with trout, perch and other varieties of fresh water fish.

The principal ranges of mountains and hills are the Cobequid Mountains, a ridge extending from Cape St. George through Antigonish, Pictou, Colchester and Cumberland counties; and

the South and North Mountains of Kings and Annapolis counties.

The Island of Cape Breton is separated from Nova Scotia by the Strait of Canso, eighteen miles in length and varying from half a mile to a mile and a half in width. The most striking geographical peculiarity of the island is the existence of salt water lakes or inland seas, called the Bras D'Or Lakes.

The scenery of Nova Scotia is diversified and picturesque, the surface presenting the alternate features of hill and vale. The less cultivated portions of the Province, with their variety of wood and stream and lake, possess attractive features of natural beauty.

Climate: Almost entirely surrounded by the sea, Nova Scotia has a temperate, humid climate. The warm waters of the Gulf Stream approach near to the southwestern end of the Province. The average temperature of the summer months, from July to September, is 62° F. and during the winter months, from November to March, 26° F. The rainfall averages about 42 inches a year. The Province has a remarkable record in regard to the number of hours of sunshine. A 12-months' record shows that Nova Scotia had 88 hours more sunshine than any other part of Canada.

Agricultural Features

The Dyked Meadows: Nova Scotia is particularly noted for its large tracts of inexhaustibly fertile dyked lands that, in earlier or later times, have been reclaimed from the sea. This land lines the headwaters of the Bay of Fundy and spreads inland along its river tributaries. The strong tides of that bay gather up great quantities of sediment from its bed and shores. When at their extreme height the tides of the headwaters flow over all adjoining land that is not dyked, and before ebbing deposit their stores of sediment upon its surface. This detritus forms the so-called "marshes" of Annapolis, Kings, Hants, Colchester and Cumberland Counties, which yield from two to three tons of hay per acre, and, in addition, afford fall pasturage for large herds of cattle. Every incoming tide leaves a deposit of rich soil, and farmers whose lands adjoin, haul and spread this "marsh mud," as it is called, on their upland fields, and thus add greatly to their fertility.

Intervales and Uplands: The Intervale lands along the rivers and small streams are invariably rich and productive. The upland is of varying degrees of fertility. Upon these lands almost any crop that can be grown in a temperate climate will do well. The conditions, however, are particularly adapted for the production of the highest quality of hay, roots, potatoes, oats and other grains. Wheat of good quality is raised by many farmers in sufficient quantities to supply at least their own household needs.

The Fruit Lands: The principal fruit section of the Province is the Annapolis Valley, so called, really comprising several river valleys, extending from the Town of Windsor, on the east, to

Digby, on the west, a section of about one hundred miles long by from five to fifteen miles in width. This valley extends east and west and is sheltered on the north and south by high ridges of hills, which afford a shelter, not only from the heavier winds, but also from the fogs of the Bay of Fundy. Here the bright, sunny weather of summer and autumn combine with other conditions to bring fruit, particularly apples, to a state of perfection rarely excelled. Aside from this valley, there are several smaller sections in outlying counties where fruit growing, though yet in its infancy, can, undoubtedly, be carried on with great success. The northern portion of Queen's County, the Hertford Valley, in Cumberland County, and portions of Lunenburg, Halifax, Colchester, Pictou and the Island of Cape Breton produce apples, plums, etc., of distinctly superior quality.

Mixed Farming Opportunities: The development of agriculture in Nova Scotia has been somewhat peculiar. Owing to the varied resources of the Province, a large proportion of those living upon farming lands have, up to the present time, not confined themselves to pure agriculture, but have entered into mining, lumbering, fishing and other enterprises. On this account many of the farms have been neglected and now need better cultivation.

The proper style of husbandry to take up on these lands is mixed farming, producing for the market milk, cream, butter, beef, pork, poultry, mutton, wool, etc., instead of hay, oats and other crude products, which, up to the present time have been too frequently sold at the expense of the virgin fertility of the fields.

Province of Nova Scotia

Fruit Growing

The fruit industry is in a higher state of development than any of the other phases of agriculture—even although as late as 1880 only 20,000 barrels of apples were exported. Since then there has been a gradual increase, until in 1911 over 1,500,000 barrels were shipped out of the Province. And yet in the Annapolis Valley alone scarce one-tenth of the available area has been set out to trees and there are large tracts elsewhere capable of producing high-class fruit that have scarcely been exploited at all.

While apples are the most important export crop, yet large quantities of plums and cherries are raised, and many fruit growers have been successful with pears, grapes and even peaches.

Experts who have examined the fruit-growing conditions of Canada from coast to coast have declared that, as a permanent investment, Nova Scotia offers one of the safest apple-growing propositions in the Dominion. These orchards, year after year, produce large crops of the finest-flavored apples, and prove a paying proposition

to the growers, who all have unexcelled access to the best markets of the world.

As for the quality of the fruit; the highest tribunal of England, the Royal Horticultural Society, awarded the gold medal to this Province in the latest competition with Ontario, British Columbia, and other parts of the British Empire. In addition, private fruit-growers from Nova Scotia captured more medals than did any of their rivals, over fifteen medals in all—including the highest medal given to any individual exhibitor.

To encourage the industry, the Governments have established an experimental station at Kentville, and the Provincial Government has set out thirty-five model orchards scattered throughout the different counties, where experiments in quantity and quality are carried on; while to insure the profits coming to those to whom the profits are due a system of co-operative fruit shippers' associations has been built up, of which twenty-nine are now being operated between Windsor and Annapolis.

Dairy Farming

Conditions in Nova Scotia are especially suitable for dairy cattle, a class of stock which, in this Province under proper management, invariably pays handsome profits. Indeed of all the classes of livestock industry Nova Scotia is best adapted to dairy husbandry. Of late the mining, manufacturing, fishing and lumbering business has developed more rapidly than the agricultural industry. The demand for dairy products, as in fact for all other farm products, is much in excess of the supply. Moreover, considering the nearness of foreign markets now being developed, it is doubtful if any part of Canada offers a better chance for the extension of the dairy industry.

Farmers who follow proper methods of feeding and breeding dairy cattle can produce milk more cheaply in Nova Scotia than in any other equal

area of Canada. This is owing to the fact that the Province raises superior root and forage crops, while the pastures are well clothed with sweet and nutritious grasses. Farmers who provide sufficient succulent feeds, such as turnips mangels, and corn silage, for winter use, can produce milk almost as cheaply in winter as in summer, the month of June excepted.

The average dairy cow in Canada gives 3,000 pounds of milk per annum. The average Nova Scotia cow gives a little less, and yet, at the Nova Scotia Agricultural College Farm, the magnificent herd of dairy cows average 10,000 pounds of milk each.

Milch cows in Province (1914), 128,237; value, \$5,126,915; other cattle, 148,269; value, \$4,289,422

Live Stock

In the vicinities of the dyked meadows and in some of the more isolated river valley areas, there are farmers who have been very successful with beef cattle. In these sections there is a strong demand for those strains of the beef breeds that are good milkers and, although such are difficult to secure, they help with their extra yield of milk to make beef raising profitable. Horses of all kinds, heavy and light, are raised and the moist, cool maritime conditions are particularly good for their development. However, it cannot be said that the average Nova Scotian is, in the strict sense of the word, a horseman, for here, as in other parts of Canada, too many nondescript horses are being raised. Neverthe-

less, the market is good for high-class animals, and anyone who understands horse raising will find it a profitable source of income on the farm. When Nova Scotian horses are exhibited at western fairs they always more than hold their own.

Nova Scotia has more than a million acres of rolling, well-watered and well-shaded pasture, which is more suitable for sheep than for any other class of stock. A large percentage of it is clothed with short nutritious grass and white clover, on which sheep of the highest type can be raised most satisfactorily. The ground adjacent to these rolling uplands is usually excellent for the production of roots, rape and mixed hay

Province of Nova Scotia

for fall and winter feeding. Owing to the cool, moist climate sheep are generally healthy and free from contagious disease. The Scottish Agricultural Commission was impressed with the belief, as evidenced in their report, that sheep are the ideal stock for Maritime Province farms, and that this industry was developing rapidly both as regards numbers and quality. Nova Scotian hills remain green throughout the entire pasture season, as the happy result of heavy dews and frequent showers.

The marked interest awakened of late in the dairying industry extends also to the raising of swine, as with plenty of such dairy by-products as skimmed milk and whey the very finest quality of bacon and ham can be cheaply produced. Indian corn, the staple food of swine in other countries, is not grown largely in Nova Scotia, but buckwheat and other grains, with turnips and mangels, make an excellent substitute. Nova Scotia hogs are not subject to disease of any kind and no trouble is found in raising healthy and vigorous animals. Conditions in the Province are particularly well adapted to the development of this branch of animal husbandry.

Wherever Nova Scotia stock has been exhibited it has always been successful. The Nova

Scotia Government aids the Agricultural Societies in importing high-class stallions, rams and bulls of the various breeds for improving stock. In this way during the past ten years, 200 high-grade stallions, 150 pure bred bulls, 150 pure bred rams and 200 pure bred boars have been brought into the Province. The services of these animals are available to breeders at a nominal cost.

Stock in Province

Horses in Province (1914), 62,581; value, \$7,-594,204; sheep, 211,921; value, \$996,029; swine, 53,892; value, \$849,877.

Breeds of Stock Recommended

Cattle: For beef: Shorthorn, Hereford, Aberdeen-Angus, Devon or Galloway. For milk: Ayrshire, Holstein-Frisian, Jersey, Guernsey, French-Canadian.

Swine: The lard hog breeds: Poland-China, Duroc-Jersey, Chester White and most strains of the Berkshire. Bacon breeds: Yorkshire, Tamworth, some strains of the Berkshires.

Horses: Raising of draft breeds is recommended. Clydesdale, Shire, Percheron are favorites. For light horses, Thoroughbred, Standard-Bred, Hackney.

Crop Returns, 1914

	Bushels	Value		Bushels	Value
Spring wheat	262,000	\$ 328,000	Mixed grains	145,000	\$ 103,000
Oats	3,461,000	2,111,000	Potatoes	7,165,000	3,511,000
Barley	138,000	116,000	Turnips, mangels, etc.	3,487,000	1,325,000
Rye	5,000	5,300			
Peas	4,200	8,600		Tons	Value
Beans	18,500	55,000	Hay and clover	979,000	\$14,196,000
Buckwheat	259,000	186,000	Fodder corn	4,000	24,000

Other Paying Crops

Small Fruits: The raising of market truck has been the means of establishing many farmers of limited capital, enabling them to live through years, until they could bring their farms up to a high state of productiveness. All kinds of vegetables grow well and are in keen demand. Strawberries and all small fruits flourish and are marketed at a good profit. Just at present there is a dearth of men skilled in the art of gardening and, unquestionably, any practical man, who will take the time to adapt himself to the new conditions, can make a splendid living for himself and his family by specializing along this line.

Cranberries: Cranberry culture promises to be a source of much profit to those engaged in the culture of this berry. On a five and a half acre bog in the western part of the Province the yield was over 300 barrels, which sold at \$5.00 a barrel. A bog of one and one-half acres in the eastern end of the Province yielded 55 barrels of cranberries, which sold for \$6.00 a barrel. The industry was started by improving some patches of wild berries in Annapolis Valley.

The bog lands common throughout the central section of the valley are being utilized for the culture of this fruit. In the vicinity of Auburn, Kings County, alone, the crop averages 5,000 barrels, netting \$25,000 to the growers.

Bee-Keeping: The abundance of the flora of Nova Scotia affords ample scope for bee-keeping. Besides the various fruit blossoms, as apple, raspberry, strawberry and wild blooms, different kinds of clover and buckwheat are extensively grown. Apiculture is now carried on successfully in some of the districts in the Annapolis Valley and Cumberland County, but the industry is as yet only in its infancy. Digby, Annapolis, Kings, Hants, Pictou, Queens and other counties are well suited for bee-keeping. In winter the bees seem to subsist just as well whether "clamped" or "cellared." As a branch to farming, the industry is considered by bee-keepers to be very profitable. So far, the local market consumes all the supply.

Province of Nova Scotia

Some Figures on Profits

These are compiled from data given by reliable local farmers, fruit growers, etc.:

Flock of 50 hens averaged net yearly profit of \$5.29 each.

Strawberries clear \$150 to \$200 an acre.

Five acres of vegetables netted \$1,427.

Average yearly profit per acre on apple orchards on a five year basis (figures by several different growers), \$190, \$225, \$213, \$219.78, \$302.60, \$304.64, \$263.25.

Net profit from flock of 50 sheep, \$145.

Turnip Growing Contest Held in 1914

Thirty boys competed, five in Cumberland, ten in Pictou and fifteen in Colchester. The yields of the first prize winners were as follows:

Cumberland	1,296 bushels
Colchester	1,266 bushels
Pictou	1,245 bushels

Varieties of Fruits, Etc., Most Successfully Grown in Nova Scotia

Apples: Nonpareil, Golden Russet, Yellow Bellefleur (or Bishop's Pippin), Ribston Pippin, Blenheim Pippin, Gravenstein, Baldwin, Rhode Island Greening, King, Fallawater, Northern Spy, Stark, Cox Orange, Fameuse (Snow), McIntosh, Duchess of Oldenburg, Ontario, Wagener, Alexander, Wealthy, Ben Davis, Dudley, Wellington, Baxter, Hubbardston.

A famous Gravenstein tree at Lakeville, N. S., over 100 years old, bearing in alternate years, had an average crop of 21.2 barrels in a 22-year period. The Gravenstein is the leading apple of the Province.

Raspberries: Marlboro for early berries; Cuthbert for late; Loudon good.

Strawberries: For early land, Crescent, Barton's Eclipse, Senator Dunlap, Warfield and Beder Wood; for late land, Sample, William Belt, Commonwealth, Brandywine.

Asparagus: Conover's Colossal, Palmetto, Argentine, Columbian Mammoth White.

Beans: Wardwell's Kidney Wax, Davis' Kidney Wax, Detroit Wax; Giant Stringless, Refugee, One Thousand to One, Red Valentine.

Beets: Good varieties are Crimson Globe, Egyptian, Crosby's Early Egyptian, Edmand's, Blood Turnip, Boston half-long Blood, Boston Blood Turnip and Long Dark Red. Early Blood Turnip has a rich color and even shape and is a good variety for all around purposes.

Cabbage: Early Jersey Wakefield, Charlestown Wakefield, Henderson's Early Summer for a general crop. For late or winter varieties the Danish Ball Head or any of the Drummond or Flat Dutch varieties are suitable.

Carrots: Early, Chantenay; late, Danvers.

Cauliflower: Early Snowball.

Sweet Corn: Golden Bantam, Mammoth White Cory, Early Crosby.

Cucumbers: White Spine.

Head Lettuce: New York, Marblehead Mammoth Cabbage, Market Gardeners Private Stock

(good for forcing). Curled or loose sort: Grand Rapids (good for forcing).

Onions: Early Yellow Cracker Early Round Yellow Danvers, Yellow Globe, Prizetaker and Adriatic Bartlett are good varieties.

Paranips: Abbott's Hollow Crowned and Student.

Peas: Alaska, First of All, Nott's Excelsior, American Wonder and Witham Wonder for early use; Gradus, Telephone, Bliss' Everbearing and Champion of England for late.

Potatoes: Early Eureka, a favorite in Cape Breton. Experimental tests with different varieties show these results (1913):

Variety	Bushels per acre
Dreer's Standard	470
MacIntyre	440
Green Mountain	430
Carmen No. 1	410
Early Ohio	415
Vick's Extra Early	410
Early Rose	400
Beauty of Hebron	390
Clark's No. 1	385
Empire State	350
Early New Queen	330
Gold Coin	310
Early Vermont	285
Irish Cobbler	280
Garnet Chi'	200

Radish: Outdoor, Icicle, Ne Plus Ultra, turnip rooted scarlet, good for forcing; Beckert's Char-tier.

Squash: Summer Crookneck, Early Mammoth White Bush for early use, Boston Marrow for fall, and Hubbard, Delicious and Golden Bronze for winter.

Tomatoes: Early, Earliana, Chalk's Early Jewel, Dominion Day, Ignatum, Early Ruby; late, Freedom, Atlantic Prize, Dwarf Champion.

Industries

Lumbering is one of the chief industries. Average yearly cut of lumber, 400,000,000 feet, of which 300,000,000 is exported. Pulpwood industry consumes 30,000 to 40,000 cords yearly.

Fisheries: Annual value, \$10,119,242; 2,838 men employed; capital invested, \$5,645,276. Leading

varieties of fish are cod, lobster, mackerel, haddock, herring. Inland fisheries yield smelt, salmon, trout, eel. Some of the finest natural oyster beds in the world are found on the Nova Scotia coast.

Coal Mining: The coal found in Nova Scotia

Province of Nova Scotia

is bituminous and coking and resembles in appearance and quality the coals of Northumberland and Durham in England. 7,203,912 long tons were mined during 1913, and 13,664 men were

employed. There are now 560 miles of railroad track underground and the timbering used during one year, if placed in a straight line, would extend for 3,500 miles.

Agricultural Instruction and Education

Elementary: The Province has a Director of Rural Education, and a Rural Science School is held by the affiliated Agricultural and Normal Colleges at Truro in July and August. Graduates of the Rural Science School are in a position to teach elementary agriculture, nature science, etc.

Short Courses are carried on at several centres, such as Yarmouth, Bridgewater, Shubenacadie, Musquodoboit.

Demonstration Work is carried on on several farms in turnip growing, crop rotation, fertilizers, renovation of old orchards.

Fruit Pests: Inspection of orchards, public meetings carried on for extermination of San Jose Scale and the Brown-Tail Moth.

Women's Institutes: First organized in Nova Scotia in 1913. Fourteen were organized.

Free Agricultural Bulletins: Some of these are on (1) Gardening, (2) Sheep Industry, (3) Soils, Soil Cultivation and Crops, (4) Horse Breeding, Swine Breeding, (5) Dairying, (6) Orchardling and Gardening. Apply to Secretary of Industries and Immigration, 197 Hollis St., Halifax, N. S.

Agricultural Colleges: There is a college at Truro which provides four principal courses: (1) A two years' course; terms November 1st to April 15th, leading to the Associate Diploma in Agriculture, (2) A two weeks' short course in January, particularly adapted to the busy farmer

or his son, who cannot leave home for an extended period, (3) A two weeks' short course in January, for ladies; subjects: Domestic Science, Dairying, Horticulture, Poultry and General Agriculture, (4) A Rural Science School in affiliation with the Provincial Normal College, for teachers, July and August. The college has lecturers in Agriculture, Bacteriology, Biology, Horticulture, Nature Study, Veterinary Science, Animal and Field Husbandry, Poultry, Chemistry, Mathematics, Physics, Mechanical Sciences, English Dairying. In connection with the college there is a farm of 291 acres, on which is kept a splendid selection of the various breeds of cattle, horses, pigs and poultry. Gardening and small fruit raising is made a prominent feature.

Education: The Province has a complete free public school system. Compulsory attendance, ages 7-12. A Technical College has been established at Halifax.

The following are the Chartered Colleges, with degree-conferring powers:

Dalhousie College and University, Halifax; King's College, Windsor; Acadia College, Wolfville; St. Francis Xavier College, Antigonish; St. Anne's College, Church Point, Digby County; St. Mary's College, Halifax. There are several Ladies' Colleges and Seminaries, notably at Halifax, Windsor, Wolfville, Redingtonham.

How to Get a Farm in Nova Scotia

Land Settlement Policy for Nova Scotia: The Government of Nova Scotia, by virtue of an Act of the Provincial Legislature, has made arrangements for the guarantee of the bonds of a provincial loan company, enabling the settler, as well as the resident within the Province, to receive a loan up to 80 per cent of the appraised value of farm property, at 6 per cent interest.

The Legislature has authorized the Government to purchase, from time to time, real estate in farming districts; subdivide this land into farms or lots, repair, alter or erect buildings and fences thereon; prepare, till and seed the land for crops; purchase stock and implements, and sell this improved real estate to selected settlers, in suitable sizes and on satisfactory terms.

Full particulars may be had by writing to the Secretary of Industries and Immigration, Mr. Arthur S. Barnstead, at 197 Hollis St., Halifax.

Cost of Land varies much, according to locality. Farms range in area from 50 to 300 acres. A list of farms for sale shows prices from \$500 to \$18,000; \$3,000 to \$4,000 might be placed as an average price.

Fuel: Nearly every farm has its own wood lot furnishing a plentiful supply of fuel.

Plenty of Land: At present there are only 56,000 occupiers of farms, which take up only 39 per cent of the 13,483,671 acres of the Province.

PROVINCE OF NEW BRUNSWICK

COUNTIES OF NEW BRUNSWICK.

Population, 1911 Census.	
Carleton	21,446
Charlotte	21,147
Gloucester	22,282
Kent	24,376
King's & Albert	30,285
Northumberland	31,184
Restigouche	15,687
St. John (and city)	23,572
Sunbury & Queens	17,116
Madawaska	28,222
Westmoreland	44,621
York	31,561

CITIES, TOWNS AND VILLAGES OF NEW BRUNSWICK.

200 Population or Over.
1911 Census.

A	
Albert	250
Albert Mines	200
Alma	250
Andover	239
Apoahqui	200
Armstrongs Brook	276
Aroostook Jc.	500
B	
Back Bay	200
Bale Verte	200
Bailie	600
Balmoral	600
Barachois	300
Barnaby River	200
Barnesville	200
Bass River	300
Bathurst	500
Bay du Vin	300
Beaver Harbor	270
Belledune	400
Belledune River	200
Benton	200
Berrys Mills	500
Berwick	200
Blacka Harbor	300
Blackville	400
Blissfield	250
Blissville	300
Bloomfield	400
Bloomfield, Kings	200
Boletown	250
Bonney River	200
Botsford Portage	250
Bristol	300
Buctouche	500
Butternut Ridge	500
C	
Calhoun	200
Cambridge	200
Campbellton	3,816
Campo Bello	1,400
Cape Bald	300

Caracquet	2,800
Centerville	1,000
Chatham	1,682
Chipman	250
Clair	200
Clifton	200
Coates Mill	200
Cocagne	200
Coldstream	300
Coles Island	300
Collins	350
Cormierville	500
Corn Hill	300
Coverdale	250

D	
Dalhousie	1,659
Dawson Settlement	250
Debec Junction	200
Deer Island	1,500
Derby	200
De Wolfe Corner	200
Doaktown	400
Dorchester	1,050
Douglas	200
Douglas Harbor	200
Douglas town	500
Dupuis Corner	400

E	
East Florenceville	200
Edmundston	1,821
Eel River Crossing	400
Egin	250

F	
Fairville	2,000
Florenceville	350
Foxcreek	500
Fredericton	7,208
Fredericton Junction	750

G	
Gagetown	223
Gardner's Creek	200
Gibson	1,500
Glassville	200
Grand Ance	700
Grand Falls	1,539
Grand Manan	3,000
Great Shemogue	300
Green River Sta.	200

H	
Hammond Vale	200
Hampstead	250
Hampton	554
Harcourt	400
Hartland	1,000
Harvey	1,500
Harvey Station	200
Hawkshaw	300
Head of Millstream	600
Hillsborough	1,000
Hopewell Cape	300
Hopewell Hill	200

I	
Irishtown	200
J	
Jolicure	250

K	
Kingston	500
Kirkland	200
Kouchibouguac	600

L	
Lameque	375
Lepreau	300
L'Etete	200
Lewisville	350
Little Shippegan	250
Loggieville	300
Lower Caracquet	1,500
Lower Newcastle	250
Lower Prince William	400
Lower Southampton	300
Lower Woodstock	250

M	
McAdam Junction	1,000
McDonald's Mills	300
McDonald's Settlement	250
Markhamville	300
Marysville	1,337
Mascarene	300
Mechanic's Settlement	250
Melrose	200
Memramcook	300
Middle Southampton	600
Millford	600
Millerton	400
Millidgeville	300
Millstream	400
Millville	1,804
Minot Harbor	300
Moncton	11,333
Moore's Mills	300
Mt Carmel	200
Musquash	250

N	
Nashwaakia	325
Nelson	200
Newcastle	2,945
New Denmark	500
New Jerusalem	250
New Mills	200
North Esk	500
Norton	250
Notre Dame	400

O	
Oak Bay	750
Oak Point	200
Oromocto	250

P	
Pelletiers Mills	200
Pennfield Centre	1,000
Penobscia	300
Perth	200
Petersville Church	200
Petitcodiac	750
Point Rocher	250
Point de Bute	250
Port Egin	300
Prince William	300

R	
Randolph	300
Red Rapids	200
Renous River	200
Rexton	600
Richibucto	612
Richibucto Village	300
Richmond Corner	275
Riordon	700
River Chario	350
Riverside	250
Robichaud	300
Rolling Dam	500
Rothney	300
Round Hill	300
Rusagornis	200

S	
Sackville	300
St. Andrews	957
St. Anthony	200
St. Basil	1,600
Sainte Croix	300
St. George	1,629
St. Jacques	200
St. John	42,499
St. Joseph	400
St. Josephs	200
St. Leonard's	275
St. Martin	400
St. Paul	3,000
St. Stephen	2,436
Salisbury	300
Scoudouc	200
Second Falls	500
Shediac	1,442
Shelfield	350
Shippegan	500
Southampton	300
Springfield, Kings	300
Springfield, York	300
Springhill	250
Stonehaven	300
Sussex	1,904
Sussex Corner	300

T	
Tabusintac	600
Tracadie	2,600
Tracey Station	250

U	
Upham	200
Upper Dorchester	250
Upper Gagetown	200
Upper Sackville	350

V	
Village St. Jean	250

W	
Waterford	1,450
Welsford	200
West Branch St.	200
Nicholas River	500
Westfield Beach	200
White's Cove	200
Wickham	250
Windsor	200
Woodstock	3,554

Y	
Young's Cove	200

PROVINCE OF NEW BRUNSWICK

Area, 17,910,400 Acres. Population, 351,889. Capital, Fredericton. Lieutenant Governor, Hon. Josiah Wood. Premier, Hon. C. J. Clarke

Historical Note

On a little island at the mouth of the St. Croix River (now part of the international boundary), a pretentious fort was built by the French in 1604, but the little company found one winter sufficient and removed to Port Royal (now Annapolis, Nova Scotia).

Charles de La Tour, a French Huguenot, who had founded a settlement near Cape Sable, Nova Scotia, crossed the Bay of Fundy and built a fort on the St. John River. After the treaty of 1632, when Acadia was restored to the French La Tour was in possession of St. John. Charnisay of Port Royal and St. Denys of Cape Breton.

Province of New Brunswick

A feud sprang up between La Tour and Charlevoix which furnishes a chapter of mediaeval romance in the early history of Acadia.

Small settlements were established by the French on the Bay of Chaleur and on Miramichi Bay, but in 1713, when this region (included in Acadia) passed under control of the British, it had practically few inhabitants but the Indians.

When Nova Scotia was ceded by France to Britain by the treaty of Utrecht in 1713 the boundaries of the Province were not well defined, and the country along the St. John River remained a subject of dispute. At the time of the expulsion of the Acadians from Nova Scotia in 1755 many of them retired to New Brunswick

and settled along the upper St. John and the Miramichi River, and in the eastern part of the Province. In 1763 the Peace of Paris settled all dispute and gave the ownership of the whole territory to Britain.

The first British settlers emigrated from Scotland to the Miramichi district in 1764, and in 1783 the United Empire Loyalist influx took place, a large body of them locating near St. John and along the St. John River. In 1784 New Brunswick was organized as a separate province.

It was named after the family of the reigning sovereign of Great Britain at the time of its formation as a province—the House of Brunswick.

Physical Features, Soil, Climate

Lying between the provinces of Quebec and Nova Scotia, in the latitude of the south of France, washed on three sides by salt water, New Brunswick has an extended coast line, many excellent harbors, and also atmospheric conditions, temperature and rainfall to make it one of the most fruitful and healthful countries in the world.

The summer climate is ideal, the winters bracing and fairly steady, the yearly record for continuous sunshine excelled by only one other province of the Dominion. For 17 years the average hours of bright sunshine at Fredericton varied from 94 in November to 238 in July. The average annual temperature taken at nine points throughout the province is 40.8 degrees; for 1914, 39.4; the average annual rainfall, 41.5 inches. For 1914, rainfall was 35.95 inches.

New Brunswick, with its many rivers, lakes and streams, is one of the best watered countries in the world. The river St. John, with its various tributaries, affords an extensive system of inland waterways for steamers and sailing craft. The Restigouche and Miramichi, the Petitcodiac and St. Croix are also navigable rivers, opening much territory to water-borne traffic. Grand Lake has an area of 47,232 acres.

Fish abound in these inland waters, and some of the best salmon and trout fishing anywhere known is to be found here.

The surface of the Province is generally undulating, but in the north and northwest there are many ranges of hills, covered with forests, of from 1,200 to 2,000 feet, with higher individual peaks. The highest elevation is Bald or Sagamook Mountain in Restigouche County, 2,604 feet. In the south along the Bay of Fundy the coast is rocky and bold. West of St. John the soil is fertile and rich, with many beautiful valleys. Along the east coast for 20 miles inland the country is flat with marshes.

An adequate water supply for farm and house-

hold purposes is easily obtained in every district, and where the country is at all rolling, springs abound, and almost upon every hundred acres a supply may be obtained from wells.

The regular and sufficient rainfall precludes any necessity for irrigation, as good cultivation will always carry the growth of crops through any period of drought yet experienced.

The soils of the Province abound in latent fertility, and it is only a question of retaining the supply of humus and rational fertilizing, with good cultivation, to obtain abundant crops.

The forest areas are very extensive and yield, next to the agricultural lands, the largest revenue. Tree growth is wonderfully rapid, and under wise administration, with protection from fire, the forests can be made practically inexhaustible. Provision has been made by the government to prevent the depletion of forests upon the watersheds and at the sources of the streams, with the object of preserving the flow of streams and rivers and maintaining the present favorable climatic conditions.

Large game is abundant in the forest areas, and is carefully guarded by the forest rangers of the government. No one is allowed to shoot moose, caribou or deer without a license. The forests of New Brunswick are considered the best moose-hunting grounds in America.

The mineral wealth of the Province is just beginning to be exploited, and there is as yet no adequate knowledge of its extent. Coal strata extend through large areas, immense iron deposits have been discovered and are being developed. Oil and gas have been struck in large quantities, and there are immense tracts of oil-bearing shales. Other minerals more or less developed are albertite, antimony, building stone, copper, galena, graphite, gypsum, manganese, salt. The value of the mineral production (1913) was \$1,049,932.

Agricultural Industries and Opportunities

Beef Raising: At present the local supply is insufficient, imports being made from Ontario and western Canada. Large pasturage areas and good water supply make the Province well adapted for beef raising. Estimated number of cattle (1914), 211,969.

Dairying: The climate of New Brunswick, with its abundance of rich, well-watered grass lands and its natural springs of pure, cold water, makes the Province especially adapted for dairying. There is freedom from flies, and the grazing season is unusually long. Farmers near the

Province of New Brunswick

cities send their milk either to distributors in the city or establish milk routes and deliver personally at a good profit. Those farther away separate the cream and send it to the creamery companies who pay on the basis of the butter fat contents of the cream. Others make butter on the farm and ship the finished product to the market, which is limitless for a good article. Still others sell the milk to cheese factories, where a superior brand of Cheddar cheese is manufactured. Dairying is particularly profitable, as its returns are prompt.

In 1913, 26 cheese factories, with 618 patrons, received 10,551,631 pounds and made 1,049,962 pounds of cheese, which sold for \$132,397.85, and 20 creameries, with 1,321 patrons, received 1,836,160 pounds of milk and 2,873,210 pounds of cream, and made 927,876 pounds of butter, which sold for \$261,892.85.

Cheese and butter are shipped to the West Indies, Cape Breton and Newfoundland, and considerable quantities are imported from Quebec and Ontario for home consumption. The farm dairy butter made in the Province would considerably exceed one million dollars in value yearly.

In 1914 there were 102,713 milch cows in the Province, value \$4,198,520, and 99,256 other cattle value \$2,650,000.

There is a dairy school at Sussex, where instruction is given in dairying and household science.

Sheep Raising: All kinds of sheep thrive well here, though the long wools are preferred by most growers. Lambs sell at good prices and are in constant demand. The Province is free from foot rot, tapeworm and those diseases which harass the flockmaster elsewhere. Local mills take all the wool produced, and at good prices. There are thousands of acres of excellent sheep land in the Province which may be acquired at a reasonable figure. Estimated number of sheep (1914), 121,739, value \$563,652.

Horses: Not enough raised to supply the local demand. In 1914 there were 65,702 horses in the Province (exclusive of towns and cities), value \$9,060,036.

Hog Raising: The principal breeds of hogs are improved Yorkshire, Berkshire and Chester White. In 1914 there were 73,325 hogs in the Province, valued at \$1,300,052. Pork-packing houses are situated at St. John and Woodstock, and hams, bacon and barrel pork are put up in a small way at other points. The market for pork and pork products is not nearly supplied by New Brunswick producers. The imports of pork and pork products are annually over one million dollars.

The following experience of an Englishman who has been in New Brunswick a few years describes the situation:

"The demand for well-cured bacon is increasing rapidly, and I could easily dispose of five times my present output within a radius of twenty miles. Owing to the great number of lumber camps, a good price is being paid for salt pork; in fact, an excellent market for the whole hog is assured. Although a beginner with excellent prospects for the future, I feel that if my output of bacon and salt pork were ten times as large, I should only be stepping on the fringe of the great demand for these commodities which obtains in this Province."

Poultry Raising: The local market is very good; owing to the large tourist travel in summer, the hotels require large quantities of eggs and fowl. Montreal, the largest city of Canada, is only one night away by train. St. John, Canada's winter port, is only six days from the British market.

Soil, climate and cost of land all favor productive poultry raising here.

The varieties that do well in this province include the popular English Dorkings and Orpingtons, and the American Plymouth Rocks, Wyandottes and Rhode Island Reds.

Prices of eggs range from 25 to 50 cents a dozen; chicken, 16 to 18 cents a pound; broilers, 20 to 26 cents a pound during summer. Turkeys at Christmas, as high as 30 cents a pound.

Ducks, turkeys and geese can be produced easily and profitably.

Potatoes: Are very extensively grown in New Brunswick. They are marketed in the large cities of Canada, the United States, the West Indies and Cuba. In 1913, 47,702 acres yielded 9,092,393 bushels, an average of 182.70 bushels per acre. Examples quoted give \$50 to \$60 per acre as an average profit. Carleton County is famous for potato growing.

Potatoes require a rich, well-drained soil, with plenty of humus. Barnyard manure should be used as well as commercial fertilizers. These do not supply humus.

Varities recommended (Early): Irish Cobbler, Rochester Rose; (Midseason) Green Mountain, Newware, Carman No. 1.

Turnips: Grown in Charlotte County and the St. John Valley and shipped to Boston. Production, 1913, from 7,918 acres, 3,604,275 bushels, an average of 455.2 bushels per acre. White Globe and Imperial Green Globe are the recommended varieties.

Roots: All kinds grow successfully. Mangels grown here are: Danish Sludstrup, White Sugar Mangel, for deep land; Yellow Eckendorfer, Yellow Globe for shallow land. Swedes—Hall's Westbury, Canadian Gem, Magnum Bonum. Carrots—White Intermediate, Yellow Intermediate.

Corn: Quebec Yellow is the only variety which can be depended upon to ripen.

Crop Returns—1914

Spring wheat, 234,000 bus.....	\$ 304,000
Oats, 6,488,000 bus.....	3,828,000
Barley, 64,000 bus.....	73,000
Peas, 10,000 bus.....	14,000
Beans, 8,000 bus.....	17,300
Buckwheat, 1,686,000 bus.....	1,028,000

Mixed grains, 29,000 bus.....	\$ 19,000
Potatoes, 10,534,000 bus.....	4,214,000
Turnips, mangels, etc., 3,201,000 bus....	1,055,000
Hay and clover, 770,000 tons.....	9,689,000
Fodder corn, 480 tons.....	2,000
Alfalfa, 300 tons.....	2,800

Province of New Brunswick

Orchard Opportunities

Apples: One of the great advantages that New Brunswick apples possess lies in their wonderfully high color and singular beauty of appearance.

The varieties of apples raised to the best advantage in the Province are Wealthy, Bishop, Pippin, Dudley, Fameuse and McIntosh Red, all high-quality dessert apples, and good sellers on the English market.

The Duchess, Wolfe River, Milwaukee, Alexander and Bethel are also grown to perfection here and find a ready sale. Most of these varieties lend themselves best to box packing, the method of handling apples that brings the highest prices.

The Duchess, Dudley, Milwaukee and Wealthy being shorter lived, smaller growing and earlier bearing varieties, are planted as fillers between the standard trees and produce apples from two to three years before the latter, thus insuring profitable returns with the least possible delay.

Location of Fruit Lands: In the Lower St. John Valley along the river most of the land has an admirable slope and is excellently adapted for apple raising. There are also hundreds of acres of high-intervale land, in the vicinity of Sheffield and Maugerville, which would yield handsome returns if planted to apples. The soil is a dark loam, several feet deep and is exceedingly fertile, being the old river bed. Here may be seen apple-trees over 100 years old, still strong, thrifty and bearing fruit. The Upper St. John Valley produces good early or midwinter fruit. In many respects portions of Albert County present conditions akin to those of the famous Annapolis Valley in Nova Scotia, and produce today specimens of the Gravenstein, the Northern Spy, Ribston Pippin and other apples, the equal in flavor of the Nova Scotia product.

In the southern part of Charlotte County, in the vicinity of St. Stephen and St. Andrews, and notably in the lower valley of the St. Croix River, the milder climate is more favorable to the production of the tenderer varieties, such as King of Tompkins, Northern Spy and Rhode Island Greening. In Westmoreland and Kent there are orchards containing many varieties of apples, also plums, pears and cherries.

Demonstration Orchards: The Department of Agriculture has conducted experiments in the

renovation and management of bearing orchards, showing results in one case of a net profit of \$88.70 per acre the first year, \$341.76 the second year, \$109.56 the third year, or a yearly average of \$176.94. Another of these orchards gave an annual net profit of \$122.24.

Strawberries: Are grown very successfully. Crop returns from different growers show profits ranging from \$200 to \$309.25 per acre.

Raspberries: A ten-year record, showing third crop as first of commercial value, gives eight consecutive crops as producing a net profit per acre ranging from \$169.89 to \$298.50.

Cost of Land: Many farm properties, considerable proportions of which are well adapted to fruit growing at prices ranging from \$20 to \$40 per acre, according to the location, the state of cultivation, the percentage of land cleared, and the presence thereon of buildings, etc. Five, ten and fifteen acre lots of choice fruit land cleared and ready for planting, and especially selected with reference to transportation facilities, etc., will cost from \$50 to \$100 per acre.

Cropping the Land: Hardly any returns are to be expected from the trees for the first five years, and the large amount of unoccupied land may be cropped. Where this is done judiciously the growth of the apple-trees is not checked, and there will be a net profit over and above all expenses. Small fruits form the most profitable inter-crop, and the cultivation which they require is beneficial to the orchard.

Early vegetables, such as beets, carrots, turnips, radishes, peas, beans, corn and potatoes, are excellent for inter-cropping, as they need good cultivation and liberal feeding, and the produce always sells well. Good potato growers will average \$100 per acre for this crop, and the total expenses will not exceed \$50 or \$55 per acre. Onions will yield from 300 to 600 bushels per acre at \$1 a bushel.

Illustration Orchards: These are in charge of the Department of Agriculture and are conducted for the purpose of testing varieties, etc. There are 23, located in different parts of the Province.

Of the 23 illustration orchards under the supervision of the department at the beginning of 1913, four were planted in 1904, four in 1905, four in 1906, four in 1907, none in 1908, one replanted in 1909, one was planted in 1910 and five in 1911.

Fruits Recommended for New Brunswick

Apples: Not recommended at all: Ben Davis, Gano.

Not to be planted on their own roots except in the most southerly sections: Northern Spy, American Baldwin, Rhode Island Greening, King of Tompkins, Gravenstein, Bishop Pippin, Ribston Pippin, Blue Pearmain, Blenheim Pippin and Ontario.

In the best sections of Albert, Kings, Charlotte, Queens, Sunbury, Westmorland and York Counties the Bishop Pippin, Ribston Pippin and Blue Pearmain can be grown successfully by top-grafting to harder stocks, such as Talman Sweet, Alexander and McMahon White.

South of a straight line drawn east and west from Woodstock to Shediac, the following varieties have proved hardy and valuable:

Summer: Crimson Beauty, Red Astrachan, Yellow Transparent.

Autumn: Duchess, New Brunswicker and Dudley.

Early Winter: Wealthy, Alexander, Wolfe River, Fameuse, McIntosh Red, Ribston Pippin (best top-grafted).

Winter: Bishop Pippin top-grafted, Bethel, Canada Baldwin and Talman Sweet. Additional winter varieties well worthy of trial are Milwaukee and Northwestern Greening.

Province of New Brunswick

North of the same line the following varieties are recommended:

Summer: Crimson Beauty, Yellow Transparent.

Autumn: Duchess, New Brunswicker, Dudley.

Early and Midwinter: Wealthy, Wolfe River, Fameuse, Alexander, McIntosh Red.

Winter: Scott's Winter, Canada Baldwin.

Winter St. Lawrence, Milwaukee.

Crabapples: Martha, Whitney, Hyslop.

Plums: Moore's Arctic, Yellow Egg, Lombard, Washington.

In the northern sections only Moore's Arctic and Yellow Egg are recommended.

Pears: Clapp's Favorite has been grown successfully in a number of places. The Ritson and Kieffer are suggested as worthy of trial. The Flemish Beauty should do well if the scab is kept under control with thorough spraying.

Cherries: Montmorency, Richmond (sour).

Raspberries: Black—Older, Hilborn, Cumberland, Purple—Columbian, Red—Herbert, recommended as best for general all-round purposes; Cuthbert, Marlboro, Yellow—Golden Queen. In the northern sections it is recommended to plant only Herbert for a red raspberry, it being harder than the others.

Currants: Black—Saunders, Collin's Prolific, Black Victoria, Red—Victoria, Pomona, Red Dutch, White—White Grape.

Gooseberries: Pearl, Downing, Red Jacket. The English varieties should not be planted inland, but may do well in the coast regions, where the climate is more akin to that of England. Whitesmith, Industry and Companion are suggested.

Blackberries: Agawam, Snyder.

Strawberries: Commercial—Bederwood, Splendid, Glen Mary, Buster, Dunlap, Sample, Greenville, Brandywine, Domestic—Splendid, Wm. Belt, Ruby, Excelsior, Bubach.

Hay and Fodder

Hay: Grows well on marsh lands, river valleys and on regular farms. Yearly crop on about 750,000 acres runs from one to two and one-half tons per acre.

Alfalfa: Being introduced, not yet widely grown. Growers advised to begin with a small acreage.

Grain Crops: Oats, barley and peas are grown. Varieties recommended: Oats (early ripening)—Daubeney, Alaska; (medium) Banner, Abundance. Barley (early ripening, 6-row)—O. A. C. No. 21, Mensury, Mandscheuri; (medium ripening, 2-row) Duckbill. Peas—Arthur, Golden Vine, Prussian Blue.

Clovers and Grasses: Clovers are soil improvers, and should be used liberally in every rotation. Mammoth Red, Alsike and Timothy are used. Orchard Grass, Tall Oak Grass and Meadow Fescue should be added to the mixture if it is to be pastured the second year, or left longer than two years in hay.

Agricultural Instruction: The provincial government has appointed a Director of Agricultural Education. A six weeks' course in agriculture is given at Woodstock and at Sussex; a third school is to be built.

Free Agricultural Bulletins

Apply to Department of Agriculture, Fredericton, N. B. Some of these are: Insecticides and Fungicides for Orchard and Garden Crops; Improvement of Live Stock; Spraying Orchards, Etc.; Fattening and Marketing Poultry; Poultry-house Construction; The Baby Chick; Field Crops and Soil Management.

Education

The free educational system comprises common schools, of which there are about 1,900; superior schools, which are established on the basis of one for every 6,000 inhabitants; and grammar schools, provision being made for one in every county. A normal training and model school is maintained at Fredericton.

University: The University of New Brunswick at Fredericton is aided by the government. The curriculum embraces classics, mathematics, science, engineering, philosophy, law, forestry.

Denominational Schools: Denominational schools are: Church of England male and female colleges at Rothesay, Kings County; the Methodist University of Mt. Allison, and boys' and girls' schools at Sackville; Roman Catholic College and Academy at Memramcook, and Roman Catholic College at Caraquet.

Transportation: The Province is well served with railways, the chief being the Intercolonial, Grand Trunk Pacific and Canadian Pacific.

Fisheries: The value of the fishery catch for a year (1912-13) was \$4,264,054. This included salmon, lobsters, cod, haddock, hake, pollock, herring, mackerel, shad, alewives, sardines, smelts, halibut, tomcod, trout, bass, oysters, clams.

Forests: The provincial government owns over 10,000 square miles. Principal wood is spruce. Other trees are cedar, fir, tamarack, maple, elm, birch, ash, butternut, poplar, hemlock. There is no district where logs cannot be cut and driven to destination by waterways. About six and one-half million acres are under license. Great Britain is the principal market for lumber.

How to Get a Farm in New Brunswick

Provincial Lands: Over seven million acres of land are still held by the crown, and large areas are leased by lumber companies, portions of which could be obtained for agricultural purposes.

Settlement Duties: For settlement duties applicant must reside on the land for three years, clear 10 acres of land, and build a house 16x20. A grant in fee will then be issued.

Ready-made Farms: A provincial act, passed in 1912, provides for the formation of a Farm Settlement Board to purchase land suitable for

farm purposes, to improve and erect buildings thereon, when necessary, and to sell to bona fide settlers at cost price, on easy terms, extending over ten years. Buildings may be erected on crown lands for settlers. A provincial loan of \$100,000 is authorized for this purpose. Write James Gilchrist, Superintendent of Immigration, 102 Prince William Street, St. John, N. B.

Improved farm lands can also be bought cheaply. List of farms for sale may be obtained from the Superintendent of Immigration.

PROVINCE OF QUEBEC

COUNTIES AND DISTRICTS OF QUEBEC

Population 1911 Census

Argenteuil	16,786
Bagot	15,304
Beauce	81,399
Beauharnois	20,802
Bellevue	21,141
Berthier	19,873
Bonaventure	28,116
Brome	13,516
Chambly and Vercheres	24,715
Champlain	42,111
Charlevoix	30,637
Chateauguay	13,323
Chicoutimi and Saguenay	63,241

Compton	29,436
Two Mountains	13,111
Dorchester	25,096
Drummond and Arthabaska	31,590
Gaspé	35,001
Hochelaga	75,049
Huntingdon	13,340
Jacques Cartier	43,023
Joliette	24,911
Kamouraska	20,844
Labelle	40,351
Laprairie and Napierville	19,335
L'Assomption	15,164
Laval	29,877
Levis	28,913
L'Islet	16,433

Lotbinière	22,159
Maisonnette	170,978
Maskinonge	16,500
Megantic	31,314
Missiquoi	17,464
Montcalm	13,862
Montmagny	17,354
Montmorency	11,215
Nicolet	30,063
Pontiac	29,414
Portneuf	20,529
Quebec	25,814
Richelieu	20,684
Richmond and Wolfe	24,491
Rimouski	31,480
Rouville	13,131
St. Hyacinthe	22,343

St. Jean and Iberville	21,893
Rheford	21,574
Sherbrooke	21,211
Soulanges	9,190
Stanstead	20,763
Témiscouata	38,130
Terrebonne	29,918
Three Rivers and St. Maurice	24,133
Vaudreuil	11,030
Wright	48,333
Yamaska	19,511

Note: Cities of Montreal and Quebec not included in respective counties.

Cities, Towns and Villages of Quebec

200 Population or Over — 1911 Census

A

Abbotsford	1,000
Abercorn	250
Action Vale	1,402
Adderley	800
Adstock	500
Agnes	417
Ahuntsic	944
Amqui	1,070
Andreville	428
Ange Gardien	1,450
Ange Gardien de Rouville	390
Angeline	300
Angers	1,500
Anjou	200
Armagh	3,000
Arthabaska	1,000
Arundel	623
Asbestos	2,224
Ascot Corner	770
Atholstan	200
Auvergne	450
Avignon	1,000
Ayer's Cliff	316
Aylmer	3,206
Aylwin	200

B

Bagotville	1,011
Ballargeon	1,000
Barachois de Malbale	1,000
Barnston	200
Bas du Sault	250
Batiscan	1,100
Beaconsfield	712
Beauce Junction	300
Beauceville	1,677
Beauceville E.	500
Beauharnois	2,003
Beaulac	431
Beaulieu	323
Beaumont	200
Beauport	5,775
Beaupre	200
Beaurivage	1,607
Beaucour	311
Bedford	1,432
Bebe Junction	200
Beche Ridge	250
Belisle's Mills	950
Belle Riviere	400
Bellevue	1,506
Beranger	200
Bergeronville	200
Bernierville	928
Bersimis	700
Berthier	1,335
Berthier Junction	225
Berthierville	1,350
Bic	2,500
Blenville	1,094
Blanche	200
Bolton	500
Bolton Centre	300
Bonaventure	1,300
Bord a Plouffe	700
Boucherville	1,097
Bouchette	1,100

C

Bourg Louis	3,000
Brakeville	4,000
Bridgeville	200
Brigham	200
Broadlands	200
Brome	518
Bromptonville	1,230
Brookdale	600
Brownburgh	523
Bryson	477
Buckingham	3,854
Buckland	350
Bury	200
Cabano	550
Cacouna	317
Calumet	850
Calumet Island	1,500
Campbell's Bay	300
Canrobert	229
Cap a la Baleine	300
Cap Chatte	930
Cap des Rosiers	700
Cape Cove	2,000
Cape Despair	200
Capelon	600
Caplin River	473
Cap Magdeleine	375
Cap-Rouge	500
Cap St. Ignace	2,630
Cap St. Martin	230
Cap Sante	1,300
Capucins	200
Cariboo Islands	200
Carillon	185
Carleton	1,500
Cartier	218
Cartierville	200
Cascades Point	400
Caughnawaga	2,000
Causapscal	1,400
Cedar Hall	1,500
Cedars	350
Chambly Basin	900
Chambly Canton	867
Champlain	1,860
Chantelle	300
Chapau	277
Charlemagne	776
Charlesbourg	2,000
Chartierville	800
Chateauguay	600
Chateauguay Basin	400
Chateau Richer	1,350
Chaudiere Station	200
Chelsea	800
Cheneyville	505
Cherry River	300
Chesterville	263
Chicot	678
Chicoutimi	5,880
Christieville	200
Clarenceville	400
Coaticook	3,165
Como	1,210
Compton	382
Contrecoeur	629
Cookshire	908
Corner of the Beach	300
Coteau du Lac	428
Coteau Landing	385
Coteau Station	638
Cote des Neiges	2,447

D

Cote Rouge	250
Cote St. Luc	303
Cote St. Vincent	350
Cowanville	681
Cross Point	700
Cushing	200
Dalhousie Station	400
Dallbair	1,500
Dalling	200
Danby	200
Danville	1,331
De Lorimier	1,275
De Ramsay	300
Des Châtillons	2,230
Deschambault	1,200
Deschenes Mills	200
D'Issrael	1,604
Dixville	484
Dorion	631
Dorval	1,949
Douglasstown	1,100
Drummondville	1,725
Dunham	200
Dunkin	200

E

E. Angus	1,400
E. Broughton	1,000
E. Clifton	650
E. Farnham	400
Eastman	622
E. Templeton	250
Eaton	200
Echo Vale	200
Egypte	400
Emileville	200
Escuminac	400
Eustis	200

F

Fabre	200
Farnham	2,560
Farnham Centre	250
Farrington	300
Father Point	250
Fermond	65
Fitch Bay	500
Fort Coulonge	611
Foster	200
Fox River	1,360
Frampont	400
Franklin Centre	350
Fraserville	6,233
Frelighsburg	222
Frost Village	225

G

Gagne	250
Garthby	800
Gascon	500
Gaspé	606
Gaspé Bay So.	400
Gentilly	250
Georgeville	250
Girard	250
Glen Murray	200
Glen Sutton	400
Gould	250
Gracefield	300
Granby	4,750
Grand Cascapedia	450

Grande Bale

Grande Bale	1,300
Grande Pénitence	310
Grand Ligne	200
Grand Mere	4,783
Grand Metis	250
Grand Pabos	600
Grand River	2,306
Grand Saint Esprit	360
Grand Vallee	325
Green River	280
Greenville	1,383
Grondines	1,100

H

Hatley	400
Hebertville	1,800
Hemmingford	313
Henryville	1,000
Herbertville	655
Holland's Mills	400
Honoreville	500
Hopetown	2,000
Howick	230
Hubertville	350
Hudson	450
Hull	18,217
Huntertown	800
Huntingdon	1,265
Huntingville	250
Huron	368

I

Iberville	1,905
Inverness	194
Iron Hill	300
Ironside	300
Island Brook	400
Ile au Noix	2,200
Ile aux Coudres	1,200
Ile aux Grues	800
Ile Bizard	800
Ile Dupas	375
Ile Perrot	360
Ile Verte	2,250

J

Johnville	300
Joliette	6,346
Joliquere	2,354

K

Kamouraska	519
Kelo	1,100
Klamka	700
Kildare	1,800
Kingsbury	263
Kingsay Falls	200
Knowlton	885

L

La Bale	2,300
Labelle	825
Lacadie	1,500
Lac a la Tortue	350
Lac au Saumon	1,171
Lac aux Sables	675
Lac Bellemare	800
La Chapelle	200
Lachenaie	650
Lachine	10,778
Lachute	2,407
Lacolle	1,080
La Conception	500

Province of Quebec[illegible]

Province of Quebec

Ste. Foy	1,100	St. Gilles	700	St. Odilon	1,200	Shawbridge	245
Ste. Genevieve	300	St. Gregoire	1,200	St. Omer	200	Shawenagen Falls	4,245
Ste. Genevieve	300	St. Guillaume	900	St. Onésime	200	Shawville	715
St. Genesviere de Ba-		St. Guillaume d'Up-		St. Ours	625	Sherbrooke	16,400
tion	1,200	ton	3,275	St. Pacome	1,200	Sherrington	400
Ste. Gertrude	1,750	St. Henri	26,327	St. Pamphile	1,200	Shigawake	815
Ste. Helene (Egout)	1,000	St. Henri, (Levin)	3,700	St. Paschal	3,350	Shirshawby	235
Ste. Helene	1,275	St. Hermas	600	St. Paul de Chert	2,500	Hillery Cove	500
Ste. Helene de Ches-		St. Hermengilde	2,500	St. Paul de la Croix	2,500	Silver Creek	500
ter	1,000	St. Hilari	1,450	St. Paul d'Industrie	1,275	Sorel	2,410
Ste. Henedine	1,100	St. Hilarion	3,000	St. Paul du Buton	1,400	So. Durham	1,150
Ste. Hippolyte de Kil-		St. Hubert (Cham-		St. Paulin	1,275	So. Ham	500
kean	550	by)	1,100	St. Paul l'Hermite	700	So. Stukely	300
Ste. Julie	1,350	St. Hubert	500	St. Paul's Bay	1,257	Spring Hill	500
Ste. Julienne	1,100	St. Hughes	2,000	St. Philemon	400	Stanbridge	500
Ste. Justine de New-		St. Hyacinthe	9,797	St. Philippe	700	Stanbridge E.	500
ton	500	St. Ignace de Loyola	250	St. Philippe d'Argen-		Stanbridge Station	1,000
St. Eleuthere	1,200	St. Irenée	1,275	teuil	375	Standford	3,200
St. Elie	1,300	St. Isidore (La Fra-		St. Philomen de For-		Stantstead	527
St. Eloi	1,300	ris)	3,500	terville	1	Stoke Centre	300
Ste. Louise	700	St. Isidore	1,900	St. Pie de Guire	1	Stonfield	235
St. Luc	1,000	St. Isidore Jr.	200	St. Pierre aux Liens	2,201	Stranham	400
St. Luc Station	500	St. Jacques	2,000	St. Pierre Baptiste	1,200	Suffield	200
Ste. Lucie de Doncas-		St. Jacques le Mineur	1,200	St. Pierre de Wake-		Sutton	200
ter	1,350	St. Janvier	1,125	field	250	Swainsburg	300
St. Elzear	300	St. Jean	5,003	St. Pierre d'Orleans	650		
St. Elzear de Laval	735	St. Jean Baptiste	1,500	St. Pierre les Bec-			
Ste. Madeline	1,050	St. Jean de Dieu	1,000	ques	1,200		
Ste. Malachi	2,000	St. Jean de Matha	2,700	St. Pierre Montmag-			
Ste. Marguerite (Dor-		St. Jean de Orleans	1,300	ny	1,400		
chester)	1,000	St. Jean l'Evan-		St. Placide	575		
Ste. Marguerite	250	gelist	2,000	St. Polycarpe	304		
Ste. Marie	3,000	St. Jean Port Joli	2,000	St. Prosper	1		
Ste. Marie de Bland-		St. Jerome (Chicou-		St. Prosper de Dor-			
ford	450	timl)	719	chester	500		
Ste. Marie Salomee	530	St. Jerome	2,475	St. Prudentienne	510		
Ste. Marthe	1,300	St. Jerome de Ma-		St. Raphael	2,700		
Ste. Martine	1,700	tane	2,054	St. Raymond	2,403		
Ste. Melanie	700	St. Jean-Thomas	875	St. Redempteur	975		
St. Emile de Mont-		St. Johns	4,500	St. Remi	1,021		
calm	275	St. Joseph (Beauce)	1,440	St. Remi d'Amherst	1,000		
St. Emile de Suffoit	1,250	St. Joseph (Richi-		St. Remi de Tingwick	950		
St. Emile de l'Ener-		lieu)	1,416	St. Robert	1,400		
gie	300	St. Joseph	514	St. Roch	500		
Ste. Monique (Nico-		St. Joseph d'Alma	1,500	St. Roch des Amains	1,000		
let)	1,000	St. Joseph de Sorel	400	St. Roch l'Achigan	2,375		
Ste. Monique	575	St. Joseph de Sou-		St. Romain	2,000		
Ste. Perpetue	1,400	langes	907	St. Romuald	2,375		
Ste. Perpetue	1,400	St. Joseph du Lac	450	St. Samuel de Gay-			
St. Pamel	1,175	St. Jovite	1,000	hurst	500		
St. Philomene	250	St. Jovite Station	250	St. Sauveur des Moe-			
St. Ephrem	1,512	St. Jude	900	taines	1,200		
St. Eulphane	1,200	St. Justin	1,000	St. Sebastien	500		
Ste. Kosaire	775	St. Lambert	3,250	St. Sebastien de	600		
Ste. Rosalie	1,200	St. Laurent	5,503	Beauce	700		
Ste. Rose	1,300	St. Laurent d'Orleans	700	St. Sever	600		
Ste. Rose du Beale		St. Lazare	2,300	St. Severin de Beau-			
St. Schastlique	757	St. Lazare de Vaud-		vage	1,100		
Ste. Sophie	1,150	reuil	1,450	St. Simeon	515		
St. Esprit	1,200	St. Leon	1,225	St. Simon (Bagot)	1,100		
Ste. Thecle	1,000	St. Leonard	1,775	St. Simon	1,200		
Ste. Theodome	500	St. Liboire	550	St. Sixte	500		
Ste. Therese	2,120	St. Liguori	1,125	St. Stanislas	4,000		
St. Etienne des Gros	2,000	St. Louis de Bonne-		St. Stanislas de Kost-			
St. Eugene	1,000	our	630	ka	200		
St. Eulalie	500	St. Louis de Gonzague	700	St. Sulpice	700		
St. Eustache	900	St. Louis de Ha Ha	450	St. Sylvestre	2,000		
St. Evariste de For-		St. Louis de Mlle		St. Theodore d'Acton	200		
myth	1,500	End	10,350	St. Theodore de Chert-			
Ste. Victoire	300	St. Luc	650	sey	1,225		
St. Fabien	250	St. Ludger	1,300	St. Thomas d'Aquin	700		
St. Faustine	600	St. Majoric	500	St. Thomas de Joli-			
St. Felicien	1,200	St. Malo	200	et	250		
St. Felix de Kingsay	1,200	St. Marc	200	St. Timothee de Cham-			
St. Felix de Valois	2,200	St. Marcel (L'Islet)	300	plain	900		
St. Ferdinand	2,200	St. Marcel	950	St. Titte	1,425		
St. Fereol	1,050	St. Martin	445	St. Tite des Caps	1,025		
St. Fidele	900	St. Mathias	300	St. Urbalde	1,400		
St. Flavien	1,500	St. Mathieu	1,000	St. Urbain	300		
St. Fortunat	500	St. Maurice	400	St. Valentin	300		
St. Francois	2,000	St. Maurice Forges	350	St. Valerien	300		
St. Francois de Salle	500	St. Michel	2,000	St. Valer	200		
St. Francois d'Orleans	550	St. Michel (Napier)	1,700	St. Valler Station	600		
St. Francois du Lac	2,500	St. Michel de Rouge		St. Victor de Tring	2,000		
St. Francois Xavier de		mont	1,050	St. Vincent de Paul	1,495		
Brompton	550	St. Michel des Saints	550	St. Wenceslas	1,675		
St. Frederick	375	St. Michel de Went-		St. Zephirin	1,750		
St. Gabriel de Brand-		worth	375	St. Zoticue	400		
on	1,431	F. Modeste	1,000	Sandy Bay	3,500		
St. George de Ma. vale	630	Moise	637	Sandy Beach Centre	500		
St. George de Wind-		Narcisse	2,500	Sant Augustin	375		
sor	1,500	St. Nazaire (Bagot)	1,000	St. Recollet	1,321		
St. Georges	1,410	St. Nazaire	200	Scotsville	400		
St. Germain de Gran-		St. Nicholas	400	Scotstown	323		
ham	2,100	St. Norbert	275	Scott Jc.	900		
St. Germain de Kam-		St. Norbert (Berthier)	375	Seal Cove	900		
ouraska	700	St. Octave	1,300				
St. Gervais	2,000						

PROVINCE OF QUEBEC

Area, 225,198,561 Acres. Population, 2,002,712. Capital, Quebec. Lieutenant Governor, Hon. Pierre le Blanc. Premier, Hon. Sir Lomer Gouin

Historical Note

The first permanent settlement effected in the territory now called Canada was the founding of the city of Quebec by Samuel de Champlain in 1608. The colonization proceeded slowly, and in 1627 Canada was handed over by the French king to the Company of One Hundred Associates. British forces under Sir David Kirke captured the colony in 1629, but it was restored to the French three years later and Champlain was made governor.

Three Rivers was founded in 1634 and Montreal in 1642. The Company of One Hundred Associates was dissolved in 1663 and the country came directly under the rule of the French government. An unsuccessful attack was made on Quebec in 1690 by the British under Sir William Phipps.

War broke out with England in 1756 and the famous battle of the Plains of Abraham led to the British securing control of all Canada by the Treaty of Paris, 1763. In 1775 the Province was invaded by an expedition under General Montgomery, who was killed in an unsuccessful attack on Quebec.

In 1791 the two provinces, Upper and Lower Canada, were formed. During the War of 1812 the French-Canadians did their share in the defense of the country. In 1837 an insurrection took place, led by Papineau and Nelson, but was put down with little bloodshed, and in 1841 Quebec (as Lower Canada) was again united to Upper Canada and responsible government established. By the confederation act Quebec became once more a separate province.

General Description

Quebec falls geographically into five sections: the old ribbons of settlement along the shores of the St. Lawrence, reaching up the east bank of the Ottawa; the eastern townships filling in the southwest corner of the Province between the St. Lawrence and the New England states, originally populated with English-speaking settlers; the Laurentian district, running north of Montreal and Quebec; the Gaspé Peninsula, and the largely unexplored country to the north of the St. Lawrence from the Saguenay to the Labrador boundary.

The valleys of the St. Lawrence and of the Ottawa are fertile and well populated. Railways run down both banks of the St. Lawrence from Montreal to Quebec, and from Montreal west to Ontario and south to the United States. North of the St. Lawrence the ribbon of settlement is not very broad, for the Laurentian range erects a barrier; but the southern section of the entire Province from the river to the United States boundary and well east to Rimouski is thickly settled with farmers and dotted with picturesque

and prosperous towns. Sections of this country are slightly mountainous and very beautiful, being interspersed with lakes and rivers. In its western part this district borders on fairly populous and, to some degree, industrial portions of the United States—New York, Vermont and New Hampshire—and across it run railways from Montreal through these states to New York, Boston and Portland. The Gaspé Peninsula is settled about its borders, and is largely given over in the summer to sport, many of its rivers being leased by fishermen, and some of its towns being summer resorts of great popularity.

Lakes, Rivers and Streams: The rivers of Quebec constitute one of its main natural features. The St. Lawrence is its chief artery, flowing right through the Province and navigable for ocean steamers up as far as Montreal. This brings Montreal 300 miles nearer to Liverpool than is New York. The channel between Montreal and Quebec has been dredged and carefully buoyed at great expense by the Dominion government, and the route from Quebec to the sea is thoroughly marked out with buoys and lighthouses.

The Ottawa River is 780 miles in length and drains an area of 80,000 square miles. There is steamboat navigation—with the help of two small canals—from Montreal to Ottawa; and above that there are long navigable stretches separated by falls or rapids. Eventually the Ottawa may form part of a great inland waterway system connecting the Great Lakes with the St. Lawrence, thereby providing a route by which ocean-going vessels from any part of the world may penetrate into the heart of Canada to the westerly limits of Lake Superior.

The St. Maurice River is navigable for forty miles, and the Richelieu is provided with a canal to permit boats to pass from the St. Lawrence at Sorel to Lake Champlain and so on down the Hudson River to New York.

The Saguenay is one of the most picturesque rivers in the world, the trip thither being a favorite holiday journey of the American tourist. It is navigable for large vessels for sixty miles and its banks are in places most precipitous and imposing.

The Province boasts two famous falls—one in the Montmorency near its mouth, and the other in the St. Maurice at Shawinigan.

It has a number of very beautiful lakes—notably Lake St. John, Lake Memphremagog, Brome Lake and the myriad lakes of the Laurentian Mountains.

Islands: The Isle of Orleans below Quebec is a fertile spot, which Cartier called the Isle of Bacchus. Anticosti is an immense island in the gulf, 140 miles long by 30 miles wide, but it is not suited for agriculture. The Magdalen Islands lie farther south in the gulf, and possess large deposits of gypsum.

Province of Quebec

Climate: The climate of Quebec is variable. In the central and southern portions it often falls to 20 degrees below zero in winter, and frequently approaches 90 degrees in summer. The severity of the winters is modified by the dry, bracing atmosphere. Rainfall: 30-year average, 39.7 inches; 1914, 32.3 inches. Temperature: 30-year average, 33.7 degrees; 1914 average, 33.3.

Agriculture: Agriculture in Quebec is of a more domestic character than in some other parts of Canada. Still, its importance is shown by the fact that the farm lands and buildings were at the last census valued at over \$350,000,000, and that the annual value of its field crops was put at nearly \$45,000,000, to which should be added \$2,500,000 for fruits and vegetables, \$5,-

250,000 for live stock, \$20,000,000 for dairy products, over \$1,000,000 for hents, \$1,000,000 for maple sugar, \$2,000,000 for eggs. Wheat runs nearly two million bushels, barley over two and three-fourths million bushels, oats over 50 million bushels, potatoes and turnips to 43 million bushels, and tobacco to five million pounds.

Apples are about the only large fruit produced, but there are many small fruits. A very comprehensive list of apple varieties suitable for Quebec is given in "Apple Culture," a bulletin issued by the Dominion Department of Agriculture. The value of the horses, cattle, sheep and poultry annually marketed is considerable. The number of butter and cheese factories is over two thousand, and they are constantly increasing.

Live Stock—1914

	Number	Value
Horses	372,009	\$50,105,892
Milch cows	733,476	24,546,720
Other cattle	625,958	24,787,937
Sheep	571,287	3,770,494
Swine	634,569	9,087,028

Dairying: Value of milk products (1911 census) is given as \$31,663,322. In 1913 there were 894 cheese factories, 578 creameries, 698 combined factories, two condensed milk factories. French-Canadian cattle strongly resemble such breeds as the Jersey and are widely bred. Ayrshire, Hereford, Durham, Jersey, Guernsey, Angus and Friesian are also raised.

French-Canadian Horses: Descended from the animals sent out from France in the early days of the colony.

Sheep: Breeds are Leicester, Shropshire, Cotswold, Lincoln, Oxford, Southdown.

Montreal Melons: A variety of melon grows to a large size in the Montreal district.

Fameuse Apple: The Montreal district is the home of this attractive dessert apple.

Tobacco: Early varieties known as "Canadian" chiefly grown—Petite Rouge, Parfum d'Italie and Canelle. Other varieties: Great and Small Havana, Comstock Spanish, Zimmer-Spanish, Connecticut Seed Leaf.

Swine: The smoked meats industry is being encouraged, building of piggeries, methods of feeding, care and management being taught by lectures and demonstration work. Breeding of Yorkshire Tamworth and Berkshires recommended.

Corn: Quebec requires a corn that reaches the glazing stage on or before the 15th of September. Varieties recommended are: Early Leaming, Early White Cap, Wisconsin No. 7 and Howie among the Dents, and North Dakota, Longfellow and King Phillip among the Flints.

Crop Returns—1914

Spring wheat, 990,000 bus.....	\$ 1,337,000
Oats, 42,119,000 bus.....	24,429,000
Barley, 2,261,000 bus.....	1,944,000
Rye, 156,000 bus.....	170,000
Peas, 432,000 bus.....	1,015,000
Beans, 89,000 bus.....	240,000
Buckwheat, 2,477,000 bus.....	2,056,000
Mixed grains, 2,970,000 bus.....	2,287,000
Flax, 8,200 bus.....	16,000
Corn, 514,000 bus.....	555,000
Potatoes, 21,811,000 bus.....	9,161,000
Hay and clover, 3,575,000 tons.....	53,196,000
Fodder corn, 237,000 tons.....	1,517,000
Alfalfa, 6,000 tons.....	81,000

Forests: There are something like 130,000,000 acres of forest land in the Province; and the timber industry stands next to agriculture in importance. In the central section of the Province, pine, spruce, fir and similar trees predominate, and conifers and birches are found in the gulf district. South of the St. Lawrence deciduous trees are more common, such as maple, cherry,

ash, oak and elm. The production of wood pulp is one of the chief industries, spruce being used for mechanical pulp, and poplar, basswood and pine for chemical pulp. Much pulp wood is also exported to the United States to feed the pulp mills there. Has forest reserve of over 174,000 square miles.

Minerals: Asbestos mining is the most profitable at present, having reached a value of over \$3,000,000 a year. Petroleum has been discovered in Gaspe. Other minerals: Copper, galena, gold, graphite, iron, magnesite, mica, natural gas, ochre, phosphate, slate, talc, chromite, clay products.

Manufactures: The Province is the next largest manufacturing section to Ontario. The articles of manufacture include lumber, flour, cheese, textiles, furniture, leather and agricultural implements. It has some marvelous water powers near Montreal, at Shawinigan (on the St. Maurice River), at Hull, at Valleyfield, and other places.

Province of Quebec

Agricultural Education

Associations: There are 83 agricultural societies, with 24,000 members; 680 clubs, with 62,000 members; 75 co-operative agricultural societies, and 30 breeders' syndicates.

Demonstration Poultry Houses are located at Shawville, Rougemont, Athelstan, Dunham, Capelton and Cookshire.

Girls' and Boys' Poultry Clubs: Organized in connection with schools, settings of eggs distributed, poultry fairs held, short courses in poultry culture given.

Short Courses: Dairy cattle and sheep given special attention.

Instruction Trains have been used effectually in this province.

Other Features: Sugarmaking schools, fruit growers' conventions, pure-bred stock sales, field crop competitions and seed fairs, fall fairs.

School Gardening and School Fairs: Four hundred and twenty-five settings of eggs were distributed in nine counties (1914); 1,480 chickens were shown by pupils at nine rural school fairs in 1913. In 1914 seven fairs were held in five centres, embracing over 60 schools. Exhibits of products from seeds previously distributed—wheat, oats, barley, corn, potatoes, flower seeds—were shown, in addition to chickens.

In 1914 there were 234 schools with gardens. The number of children working in these gardens was 7,740. In the counties of Portneuf and Champlain there were in 1914, 49 schools with gardens, operated by 960 children. In the village of St. Casimir de Portneuf a garden school products exhibit was held. Over 300 scholars took part. There were over 175 exhibits of vegetables, 75 of domestic work; 65 chickens; 22 sheaves of Banner oats, hand selected by the pupils; 18 plates of fruit; 20 jars of preserves, paintings and other special exhibits. The fair was attended by over 1,600 people.

Co-operative Organizations: These are by demonstration and instruction improving meth-

ods in butter and cheese making, orcharding, tobacco growing, etc.

Drainage: Ditching machines have been operated to demonstrate value of drainage.

Agricultural Schools

Macdonald College: Located at Ste. Anne de Bellevue, Quebec; extent of property, 786 acres; affiliated with McGill University. It gives a two-year course, designed for farmers' sons who wish to return to their farms, and a four-year course for the degree of B. S. A. Household science school also in connection with college.

Oka Agricultural Institute: At La Trappe, Quebec. Belongs to the Trappist Fathers; 2,000 acres, half untilled, soil of many varieties, live stock includes dairy cattle, pigs, sheep, horses, bees, poultry. Gives four-year course for B. S. A. degree. Students 1914-15 session, 87.

Agricultural School of Ste. Anne de la Pocatiere has farm of 620 acres, live stock. Gives two and three year courses for agricultural diplomas. Short course for farmers during winter. Enrollment 1914-15, 64 students.

School of Comparative Medicine and Veterinary Science, Montreal, gives three-year course for degree in veterinary science.

Education

The Province has a system of free public school instruction, with elementary schools, model schools and academies. McGill University, Montreal, has departments in arts, law, medicine, applied science. Other colleges: Laval University, Quebec; Macdonald College, Ste. Anne de Bellevue; Bishop's College, Lennoxville; Presbyterian College, Diocesan Theological College, Wesleyan College, Congregational College, Laval University, Montreal.

Lands in Quebec.

Seventy-five million acres available for settlement; 6,293,045 acres surveyed and accessible by colonization roads.

Provincial government sells land from 20 cents to 50 cents an acre. Settler must build house 16x20 feet, clear 15 per cent of lot, live on land all the time until patent is granted. For infor-

mation, write Minister of Crown Lands, Quebec. Improved land in farms of 100 acres can be purchased at from \$20 to \$30 an acre.

Chief colonization districts are: Lake St. John district, Ottawa Valley, Temiscamingue or Upper Ottawa.

PROVINCE OF ONTARIO

COUNTIES AND DISTRICTS OF ONTARIO.

Population, 1911 Census.	
Algoma	73,380
Brant	19,259
Brockville	18,831
Bruce	30,032
Charleton	28,406
Dufferin	17,740
Dundas	18,165
Durham	26,411

Elgin	2,102	Leith and	26,068	Prescott	26,068
Emsex	6,722	Midington	20,386	Prince Edward	17,150
Frontenac	21,844	North	35,420	Renfrew	51,460
Glenagarry	21,259	North-west	50,795	Russell	39,434
Grenville	17,355	Northumberland	21,233	Simcoe	85,053
Haliburton	22,844	North York	21,110	Thunder Bay and	34,775
Hastings	22,306	Ontario	32,892	Kainy River	67,200
Huron	32,000	Quebec	41,006	Victoria	38,199
Kearney	6,083	St. John	47,371	Waterloo	63,607
Lambton	31,332	St. Lawrence	26,547	Welland	42,163
Leamark	34,373	St. Peter	41,182	Windsor	34,634
Leeds	18,222	St. Paul	40,650	York	116,481

Note: Cities of Brantford, Hamilton, Kingston, London, Ottawa and Toronto are not included in their respective counties.

Cities, Towns and Villages in Ontario

200 Population and Over—1911 Census

A		B		C		D		E		F	
Acton	1,720	Blair	200	Castleton	450	Dashwood	600	Dartmouth	300	Fairfield East	200
Admaston	2,300	Blenheim	1,386	Cataraugus	300	Deer Park	900	Deerpark	300	Falls View	200
Agincourt	200	Blind River	2,338	Cavanville	200	Delaware	300	Deerpark	300	Farran's Point	400
Albion Harbour	200	Bloomfield	610	Cayuga	736	Demarest	300	Dickinson's	2,018	Fenelon Falls	1,000
Alva Craig	568	Bloomsburg	200	Cedar Dale	400	Delhi	500	Dixie	450		
Alvaxandra	2,318	Bluevale	300	Cedar Grove	250	Demarestville	200	Dorion	600		
Alfred	800	Blyth	1,002	Centralia	250	Denbigh	200	Douglas	600		
Allenford	300	Bobcaygeon	1,092	Centerville	300	Depot Harbor	657	Drayton	700		
Alliston	1,270	Bolton	707	Chantry	400	Dewar's	2,018	Dreaden	1,551		
Alma	200	Bonfield	484	Chapleau	1,500	Drumbo	500	Dryden	718		
Almonte	2,452	Bonkton	200	Chatham	10,760	Dublin	200	Dunclark	600		
Aiton	600	Boston	250	Chathamworth	357	Dundale	300	Dundale	4,287		
Alvinston	200	Bothwell	690	Chesapeake	400	Dunell	200	Dunell	300		
Ameliasburg	250	Bourget	500	Chelmsford	550	Dunell	300	Dunell	300		
Amherstburg	2,536	Bowmanville	2,811	Cheltenham	250	Dunell	300	Dunell	300		
Angara	200	Bracebridge	2,776	Chepstowe	200	Dunell	300	Dunell	300		
Angasier	300	Bradford	946	Cherry Valley	200	Dunell	300	Dunell	300		
Angus	250	Braeside	600	Chesley	1,730	Dunell	300	Dunell	300		
Appin	200	Brantford	3,085	Chesleyville	683	Dunell	300	Dunell	300		
Apple Hill	300	Brechin	200	Christiana Island	707	Dunell	300	Dunell	300		
Appleton	350	Breslau	200	Chutes	300	Dunell	300	Dunell	300		
Arden	200	Bridgeburg	1,775	Blondeau	400	Dunell	300	Dunell	300		
Ardena	200	Bridgeport	200	Claudeboye	200	Dunell	300	Dunell	300		
Arrior	4,305	Bridgeport	300	Claremont	500	Dunell	300	Dunell	300		
Arthur	1,098	Brigden	600	Clarence Creek	200	Dunell	300	Dunell	300		
Ashton	250	Bright	480	Clarksburg	700	Dunell	300	Dunell	300		
Athens	800	Brighton	1,318	Clarkstown	300	Dunell	300	Dunell	300		
Atwood	500	Britannia Bay	9,373	Clifford	585	Dunell	300	Dunell	300		
Austville	1,800	Brookville	300	Clinton	2,261	Dunell	300	Dunell	300		
Aurora	1,001	Bronte	300	Coblen	5,430	Dunell	300	Dunell	300		
Avening	400	Brooklin	200	Coben	600	Dunell	300	Dunell	300		
Avonmore	2,000	Brougham	250	Cobenok	600	Dunell	300	Dunell	300		
Aylmer	2,223	Brownville	300	Coburn	5,073	Dunell	300	Dunell	300		
Ayton	450	Brucefield	200	Cochrane	1,714	Dunell	300	Dunell	300		
		Bruce Mines	685	Cockburn Island	275	Dunell	300	Dunell	300		
		Bruceville	902	Colborne	900	Dunell	300	Dunell	300		
		Burford	750	Coldwater	200	Dunell	300	Dunell	300		
		Burgessville	300	Colebrook	7,077	Dunell	300	Dunell	300		
		Burk's Falls	973	Collingwood	7,077	Dunell	300	Dunell	300		
		Burlington	1,331	Collins Bay	300	Dunell	300	Dunell	300		
		Burrill's Rapids	250	Comet	600	Dunell	300	Dunell	300		
		Bush Glen	200	Conestogo	400	Dunell	300	Dunell	300		
		Byng	200	Connaught	500	Dunell	300	Dunell	300		
		Byng Inlet	300	Consear	1,000	Dunell	300	Dunell	300		
		Byron	300	Consear	1,000	Dunell	300	Dunell	300		
				Conway	1,500	Dunell	300	Dunell	300		
				Cookstown	600	Dunell	300	Dunell	300		
				Cooksville	400	Dunell	300	Dunell	300		
				Copetown	300	Dunell	300	Dunell	300		
				Copleston	200	Dunell	300	Dunell	300		
				Copper Cliff	3,086	Dunell	300	Dunell	300		
				Copetown	300	Dunell	300	Dunell	300		
				Cordova Mines	550	Dunell	300	Dunell	300		
				Cornwall	6,598	Dunell	300	Dunell	300		
				Corunna	300	Dunell	300	Dunell	300		
				Courtland	300	Dunell	300	Dunell	300		
				Courtright	375	Dunell	300	Dunell	300		
				Credit Forks	300	Dunell	300	Dunell	300		
				Credlon	750	Dunell	300	Dunell	300		
				Creemore	643	Dunell	300	Dunell	300		
				Creighton Mine	300	Dunell	300	Dunell	300		
				Crysler	1,100	Dunell	300	Dunell	300		
				Culter	300	Dunell	300	Dunell	300		
				Cumberland	300	Dunell	300	Dunell	300		
				Cummings	2,000	Dunell	300	Dunell	300		
				Bridge	2,000	Dunell	300	Dunell	300		
				Cundies	200	Dunell	300	Dunell	300		
				Curran	300	Dunell	300	Dunell	300		
				Cutler	400	Dunell	300	Dunell	300		
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						Dunell					

Province of Ontario

Pergus	1,534	Innerville	300	Melbourne	300	Ottawa	750
Finch	411	Innisville	200	Merrill	300	Otter Sound.	12,555
Fingal	400	Inwood	350	Merriville	991	Oxford Mills.	500
Fitzroy Harbor	250	Iroquois	849	Metcalf	1,670		
Flaherty	600	Jallington	300	Micaville	400		
Fletcher	200			Mickaburg	200		
Flinton	200			Middlemiss	850		
Floradale	250			Middleport	200		
Florence	400			Middleville	200		
Fonthill	250			Midland	4,680		
Fordeich	700			Midway	1,000		
Forest	1,444			Millford	250		
Forester's Falls	250			Millbank	400		
Formosa	500			Miller Brook	793		
Fort Erie	1,147			Millie Roches	600		
Fort Frances	1,453			Milton	1,037		
Fort William	16,480			Millerton	1,407		
Fournier	375			Minden	250		
Foxboro	300			Mitchell	1,766		
Frankford	700			Mond	200		
Frankville	700			Munkton	350		
Freshion	250			Moorefield	300		
French River	300			Mooretown	250		
Fullarton	200			Moose Creek	400		
				Morewood	350		
G				Morpeth	300		
Gait	10,320			Morrisburg	1,696		
Gananoque	3,764			Morrison	300		
Garden Hill	250			Morton	250		
Garden Island	150			Moulinette	300		
Garden River	1,500			Mount Albert	500		
Garrison Mine	300			Mount Brydes	400		
Georgetown	1,571			Mount Forest	1,837		
Glamis	225			Mount Hope	200		
Glenallen	300			Mount Pleasant (Brant)	450		
Glenoe	200			Mount Pleasant	200		
Glen Morris	250						
Glen Robertson	400			N			
Glen Williams	400			Nairn Centre	200		
Goodrich	4,522			Nanticook	200		
Goodwood	300			Napanee	2,807		
Gorrie Bay	1,703			Napier	250		
Gorrie	550			Navan	300		
Gowanda	400			Newstadt	468		
Drafton	775			Newboro	468		
Grand Valley	1,000			Newburgh	465		
Grand View	400			Newbury	377		
Gravenhurst	1,621			Newcastle	655		
Greenwood	200			New Dundas	300		
Grimsby	1,689			New Hamburg	1,494		
Guelph	15,153			Newington	300		
				New Liskeard	2,207		
H				New Lowell	250		
Haddo	200			Newmarket	2,908		
Hageraville	1,106			Newton	200		
Haleybury	3,474			Newton Brook	250		
Halliburton	482			New Toronto	300		
Hamilton	81,881			Niagara	1,318		
Hampton	300			Niagara Falls	9,245		
Hanover	2,342			Nilestown	200		
Harbord	200			Nobleton	200		
Harrisburg	300			Norham	200		
Harriston	1,421			Norman	200		
Harrow	500			North Augusta	500		
Harrowsmith	400			North Bay	7,715		
Harwood	300			North Cobalt	200		
Hastings	883			North Gower	300		
Havelock	1,433			North Lancaster	250		
Hawkesbury	4,391			North York	250		
Hawkestone	350			North Toronto	5,382		
Hawkeville	250			Norval	1,100		
Hawthorne	200			Norwich	800		
Head Lake	700			Norwood	200		
Helen Mine	300			Nottawa	300		
Hensall	792			Novar	200		
Hepworth	309			O			
Hespeler	2,368			Oakland	200		
Hickson	200			Oakville	2,372		

Province of Ontario

St. Thomas..... 14,050	Steeleton..... 3,936	Tomstown..... 200	Wellandport..... 250
St. Williams..... 200	Stella..... 250	TORONTO..... 376,240	Wellenley..... 700
Salem..... 500	Stevensville..... 300	Tottenham..... 507	Wellington..... 785
Salisbury..... 200	Stewart Town..... 900	Trenton..... 3,984	Wendover..... 250
Sand Point..... 350	Stirling..... 550	Trout Creek..... 400	Westboro..... 500
Sandwich..... 2,302	Stittville..... 200	Tweed..... 1,368	W. Flamboro..... 350
Sarnia..... 9,936	Stoney Creek..... 500	Tyrone..... 200	W. Lorne..... 740
Sault Ste. Marie..... 10,986	Stoney Point..... 350		Westmeath..... 250
Searboro J.C..... 300	Stouffville..... 1,025	U	Weston..... 1,875
Schomberg..... 600	Stratford..... 12,929	Udora..... 250	Westport..... 863
Schreiber..... 400	Strathcona..... 350	Union..... 350	W. Toronto..... 12,000
Scottland..... 1,983	Strathroy..... 2,821	Unionville..... 500	Wharfedale..... 300
Scrimville..... 500	Streetsville..... 543	Uxbridge..... 1,433	Whitby..... 2,247
Sealey's Bay..... 200	Stroud..... 200		Whitechurch..... 200
Selby..... 225	Sturgeon Bay..... 200	V	White River..... 600
Selkirk..... 400	Sturgeon Falls..... 2,188	Vanessa..... 200	Whitevale..... 250
Severn Bridge..... 300	Sudbury..... 4,135	Vankleek Hill..... 1,577	Whitney..... 2,000
Shakespeare..... 450	Summerstown..... 250	Vara..... 400	W. Lorne..... 2,264
Shallow Lake..... 750	Station..... 250	Vernor..... 200	Wikwemikong..... 900
Shannonville..... 400	Sunderland..... 600	Vernon..... 500	Williamsburgh..... 300
Sharbot Lake..... 450	Sundridge..... 420	Vernon..... 250	Williamsford..... 300
Sharpston..... 200	Sutton West..... 793	Verona..... 250	Williamstown..... 600
Shedden..... 350	Swansea..... 200	Victoria Harbor..... 1,800	Wilton..... 250
Shedden..... 350	Sydenham..... 600	Victoria Mines..... 600	Winchester Springs..... 400
Shelburne..... 1,113		Victoria Road..... 250	Windham Centre..... 250
Sherkston..... 200	T	Vienna..... 332	Windsor..... 17,819
Simcoe..... 3,227	Tagona..... 350	Vittoria..... 525	Wingham..... 2,238
Singhampton..... 200	Tamworth..... 300	W	Winona..... 800
Slate River..... 300	Tara..... 551	Waldemar..... 200	Wolfe Island..... 500
Smithfield..... 200	Tavistock..... 981	Wales..... 400	Wolverton..... 225
Smiths Falls..... 6,361	Tecumseh..... 250	Walkerton..... 2,601	Woodstock..... 607
Smithville..... 600	Teeswater..... 553	Walkerville..... 3,302	Woodville..... 9,321
Sombra..... 400	Teesville..... 300	Wallaceburg..... 3,438	Woods..... 300
Southampton..... 1,681	Thamesford..... 400	Wallacetown..... 350	Worthington..... 250
So. Gower..... 200	Thamesville..... 809	Walsingham Centre..... 400	Wroxeter..... 366
So. Indian..... 350	Therford..... 559	Wardsville..... 240	Wychemwood..... 700
So. Mountain..... 503	Thessalon..... 1,945	Warkworth..... 800	Wykebridge..... 250
So. River..... 300	Thornbury..... 791	Warren..... 500	Wyoming..... 600
So. Woodlee..... 300	Thornhill..... 850	Washago..... 400	
Spanish Mills..... 200	Thornton..... 200	Waterford..... 1,083	Y
Spanish Station..... 200	Thorsold..... 2,265	Waterloo..... 4,360	Yarker..... 500
Sparta..... 400	Tibbury (Kent)..... 962	Watford..... 1,092	York..... 400
Spencerville..... 400	Tilburg..... 2,758	Wauhaushene..... 1,000	
Spragge..... 400	Tilvorton..... 342	Webbwood..... 657	Z
Springbrook..... 200	Todmorden..... 500	Welland..... 5,311	Zephyr..... 200
Springfield..... 350	Toledo..... 450		Zurich..... 600
Springford..... 300			
Stamford..... 500			
Staples..... 1,039			
Stayner..... 500			

PROVINCE OF ONTARIO

Area, 166,951,636 Acres. Population, 2,523,274. Capital, Toronto. Lieutenant Governor, Hon. John S. Hendrie. Premier, Hon. W. H. Hearst

Historical Note

Although Ontario was well explored as early as the time of Champlain, no attempt at settlement beyond the establishment of trading posts was made until about 1784. Then about 10,000 United Empire Loyalists settled on the frontier along the St. Lawrence and Bay of Quinte and in the Niagara Peninsula. Several settlements were also formed by retired soldiers—Sir John Johnson's regiments in the St. Lawrence Valley, Butler's Rangers along the Niagara and Detroit rivers.

Prior to 1791 four districts were formed with a judge and a sheriff for each—Eastern, the St. Lawrence settlements; Midland, the Bay of Quinte region; Home, the Niagara frontier; Western, the Amherstburg district. The Constitutional Act of 1791 gave Ontario a separate provincial government under the name of Upper Canada.

The Province began now to increase steadily in population, many British settlers immigrating. The Glengarry Fencibles to the number of 1,100

came in 1804 to the St. Lawrence townships; Lord Selkirk attempted to found a colony on Lake St. Clair; Colonel Thomas Talbot fostered settlements in the southwestern part of the Province. The subsequent settlement of Ontario is a history of continuous immigration of English, Irish and Scottish settlers frequently forming themselves in distinct "settlements." The Canada Company did much to settle the inland districts, the town of Galt being named after the secretary of this company.

The demand for responsible government culminated in the Mackenzie rebellion of 1837 and led to the Union of Upper and Lower Canada under one government. In 1867, however, the Province became again separate under the new name of Ontario.

Extent and Physical Features

Greatest extent from north to south, 1,075 miles, from east to west, 1,000 miles. It is three and a third times the size of the British Isles.

Province of Ontario

May be divided into two sections: (1) Southern (or older) Ontario, lying in the area bounded by the Ottawa River, River St. Lawrence and Lakes Ontario, Erie and Huron; extent, 77,000 square miles; (2) Northern (or new) Ontario, lying north of Lakes Huron and Superior and reaching to Hudson Bay on the north and Manitoba on the west; extent, 330,000 square miles.

Running roughly from east to west through northern Ontario is the Laurentian region of rocks, valleys, lakelets and muskegs or peaty swamps. This physical feature forms the divide or water-parting for the drainage of the Province. On the south side is the basin of the St. Lawrence, with its tributary, the Ottawa. On the north side is the basin of the rivers flowing into James and Hudson bays.

In that part of the St. Lawrence basin south of Lake Nipissing is the triangular peninsula of Southern Ontario. Generally of clay loam or sandy loam, that area is undulating in surface, rich and retentive in soil; good in natural drainage, plentiful in pure spring water; and, as adjacent to the Great Lakes, abundant in rain. The soil is capable of yielding a great diversity of the best products, pasture grasses for live stock, all kinds of cereals, a wide range of vegetables, many kinds of apples, and the finest of other fruits, such as the grape and the peach.

In the basin of the rivers flowing north of the Laurentian plateau is an area of many million acres of as fine farming land as that of southern Ontario, and in some ways more favored than the dead level clay stretches of Manitoba. This is the Great Clay Belt of northern Ontario. Of a much lower altitude, and with a better climate than the Laurentian range, that area is finely adapted for the production of cereals, vegetables and grasses, for dairying, and the raising of live stock. Cultivated in small part, the country meantime is mainly a vast and valuable region of forests mottled with splendid mineral areas, the home of the lumberman and the lure of the miner. It is also a country of lakes, countless lakelets and many magnificent streams.

Climate: (1) Old Ontario—Summers warm and delightful; winters cold, dry and exhilarating. Average amount of sunshine for the year, as shown by six stations, is 1,920 hours out of a possible 4,457. The highest temperature at Toronto in July for a period of thirty years averaged 90.9 degrees; the lowest, 48.4, and the monthly mean, 68.8; the highest in February averaged 44.2; the lowest, 8 below zero, and the monthly mean 31. The highest at Ottawa (256 miles northeast) in July averaged 90.8; the lowest, 47.9, and the monthly mean 68.7; the highest in February averaged 40.3; the lowest, 20.7 below zero, and the monthly mean 12.6. Average annual temperature for 1914 was 39.8, taken from eight points.

The rainfall is adequate and is well distributed throughout the year. The average for thirty years is 24.9 inches of rain and 73.2 inches of snow. With ten inches of snow as equal to one inch of rain, the total annual precipitation would be the equivalent of 51.54 inches of rain. Precipitation for 1914 was 25.5 inches.

(2) New Ontario—Summers warm; winters very cold and bracing. Longer hours of sunlight than older Ontario. Average temperature considerably lower.

It must be remembered that the Province has so wide a range that climatic conditions differ widely in different parts.

Agricultural Areas: There are thirteen and a half million acres of land under cultivation, over fourteen million acres are cleared, and fully twenty-four and a half million acres are assessed.

Beyond this cultivated portion (a few small spots excepted), northern Ontario contains twenty million acres of alluvial soil. In old Ontario there are 175,000 farms whose value ranges from low figures up to \$50,000 and over. The value of farm lands, buildings, implements and live stock is fully \$1,405,000,000.

Mixed Farming: The Province has been for many years devoted to general agriculture or mixed farming. The average farmer combines the growing of grain, roots and grasses; the raising and feeding of live stock, including poultry; the production of milk for the home dairy, the cheese or butter factory, or towns and cities; and the cultivation of a few acres of orchard. He has learned the wisdom of transforming his grain, root and fodder crops into live stock and animal products—beef, bacon and fowl, and the various dairy foods.

Agricultural Guide to Ontario Counties

Algoma: Becoming more an agricultural district as local markets develop. Potatoes and roots. Seed potato growing becoming a specialty. More sheep raised than any other class of live stock. Orchard and small fruits successfully grown on St. Joseph Island.

Brant: General farming; considerable pure-bred live stock raised.

Bruce: Chiefly grain growing and live stock.

Carleton: A leading dairy county.

Dufferin: Live stock, dairying and field crops chiefly.

Dundas: An important dairy section.

Durham: Apple industry. Well-known centre for pure-bred stock, particularly in horses; also for dairying.

Elgin: Has a most miscellaneous production agriculturally. Live stock of all kinds largely raised. Canning factories. Milk condensories.

Essex: Corn most important crop; large quantities of seed corn grown. Tobacco a specialty. In south intensive vegetable growing—tomatoes, onions, celery, radishes, all kinds of vegetables grown under glass. Grapes and peaches. Large numbers of hogs fed.

Frontenac: A good dairy section.

Glengarry: Known as a dairy centre.

Grenville: A dairy section.

Grey: General farming.

Haldimand: General farming.

Halton: General farming and fruit raising.

Hastings: Has more dairy cattle than any other county in eastern Ontario.

Huron: This county has the third largest record for horses in the Province.

Province of Ontario

Kent: Like Essex, this county is developing intensive farming. It grows nearly half the beans raised in the Province.

Lambton: General farming, but fast becoming a leading fruit district; peaches and other tree fruits raised with much success.

Lanark: A good cheese and butter section.

Leeds: Celebrated as a dairy district.

Lennox and Addington: Chiefly given to dairying.

Lincoln: Leading fruit district. Canning and jam factories successfully conducted. Peaches, grapes and small fruits especially grown. Intensive methods being introduced in orchard and garden.

Manitowlin: Sheep industry the largest feature.

Middlesex: An all-round agricultural county—live stock, dairying, market gardening and fruit.

Muskoka: Sheep the leading branch of live stock.

Nipissing: Cattle are more numerous than sheep in this district.

Norfolk: Noted for progressive agriculture; co-operative work. Orchards, pure-bred horses.

Northumberland: Active in dairying, apple-growing and general farming.

Ontario: This county has an international reputation for pure-bred cattle, horses, sheep and swine.

Oxford: The greatest dairy county in Canada. Ingersoll cheese market has a world-wide reputation. Cream, fancy cheese, condensed milk.

Parry Sound: Has been largely lumbering district. Now developing live stock industry and general field culture.

Peel: General farming, with a number of leading breeders of cattle, swine, sheep and horses; city milk, beef.

Perth: General farming, dairying, pure-bred live stock.

Peterboro: Developing into an important dairy district, although general farming prevails.

Prescott: A county in which dairy cows lead any other class of live stock in number.

Prince Edward: Crops for the many canning factories, tomatoes particularly; cheese factories and creameries. Considerable fruit is also raised.

Rainy River and Kenora: A comparatively new district, rapidly opening up to general farming. Poultry a promising industry. Potatoes and peas show large yields, and should make excellent seed. Both fall wheat and spring wheat do well; so do the other grains.

Renfrew: Well to the front as a dairy county, while live stock generally is largely raised.

Russell: Dairying and general farming.

Simcoe: Field crops, roots, horses, cattle, dairying, sheep, etc. A good all-round farming district.

Stermont: Given mainly to dairying.

Sudbury: A new district, showing splendid yields of peas and potatoes.

Temiskaming: An immense yield per acre of peas in 1914. New country requiring considerable clearing.

Thunder Bay: New district, giving promise of good yields for grain and root crops, as in the case of other northern sections. Also promising as seed district.

Victoria: Coming to the front for dairying and general live stock raising.

Waterloo: Good for general farming and the average high quality of its live stock.

Welland: Fruit raising and general farming here.

Wellington: A great live stock county. Ontario Agricultural College located here.

Wentworth: Fruit and truck raising, canning and jam factories, pure-bred stock, and general farming.

York: Much truck farming or market gardening; fruit raising, dairying for the serving of milk for city consumption, for ice cream, for butter, etc.

Vegetables

Vegetable Growing: Ontario is well suited for the production of every variety of garden vegetable, such as cabbage, celery, cucumbers, onions, tomatoes, carrots, beets, cauliflower, asparagus, radishes, lettuce, peas and rhubarb. The following are average crops per acre: Cabbages, 10 tons; cucumbers (small), 5 tons; tomatoes, 250 bushels, potatoes, 200 bushels; onions, 300 bushels. Onions have yielded as high as 1,200 bushels.

Owing to the rapid expansion of the cities, large tracts of market gardens have been taken up and utilized for city lots, and at the present time vegetable growers are unable to supply the demand of the rapidly increasing population.

Canning Factories: There are 64 in the Province, chiefly in the Niagara district and Prince Edward County. They pay the farmers about \$800,000 yearly for produce, which includes: Tomatoes, peas, corn, beans, pumpkins, asparagus, rhubarb, apples, pears, peaches, plums, gooseberries, raspberries, blackberries, strawberries.

Tobacco: The rich soil and warm climate of the southern border counties appear favorable to the production of excellent grades of tobacco. Essex and Kent are the two main counties engaged in this industry. In 1911 about 15,000 acres were under cultivation, with a yield of 20,000,000 pounds and a value of 2,000,000 dollars. In 1912 the acreage was 10,749. Many kinds of tobacco are grown, but the White Burley predominates. The complete cost of cultivation is practically \$50 per acre, the average crop is 1,250 pounds per acre, and the average price is 10 cents per pound, which varies with the year and goes as high as 17 cents.

Fruit Growing in Ontario

Ontario produces 75 per cent of all fruits grown in Canada. The total orchard acreage in 1912 was 294,675 acres; small fruits, 334,795 acres;

vineyards, 11,634 acres. The bulk of the fruit is consumed by local consumption. The western markets for Ontario tender fruits are of growing

Province of Ontario

importance. Peaches, apples and pears are exported to Great Britain. An experimental fruit farm has been established in the Niagara district, one object being to develop varieties suitable for long shipment. Over 50 co-operative fruit growers' associations do a good work in producing, packing and marketing fruits.

Apples: According to the Dominion census of 1911 there were in Ontario 7,766,257 apple trees, with a total production of 8,305,462 bushels of fruit. These figures are low, as the year 1910 was one of comparative failure of the apple fruit. The Province produces 60 per cent of the total crop of apples in Canada. The bulk of the crop is sold within the Province. During the past ten years Ontario has exported more apples to Great Britain than any other province or state on the continent. The western provinces take annually about 1,000,000 bushels. This market is growing. The principal commercial apples in order of ripening are: Duchess, Wealthy, Snow, Ribston Pippin, McIntosh, King, Greening, Baldwin, Golden Russet, Spy.

Along the St. Lawrence the McIntosh Red, Snow or Fameuse, Wealthy, Ben Davis, Russet are the chief varieties. Yellow Transparent, Duchess, Wealthy and McIntosh in the Ottawa Valley. Ben Davis, Spy, King, Greenings along the north shore of Lake Ontario, southern and central counties of western Ontario. Winter varieties are chief crop of Georgian Bay fruit district.

Grapes: The counties of Lincoln, Wentworth and Welland produce 95 per cent of grapes grown. In these counties there were, in 1913, 8,889 acres of vineyard. The total output in 1913 was 36,000 short tons. The vine begins to bear at four years, and continues a lifetime. A grower in Niagara district estimates maintenance and profit per acre as follows: Cost of bringing into bearing, \$75; annual outlay when bearing (pruning and tying, cultivation, spraying three times, packing and packages), \$58.50. Average yield, three

tons, or 700 baskets, at average price, 15 cents—\$112.50. Net returns, \$54. Markets, Toronto, Hamilton and other neighboring cities, western and eastern provinces. Wine manufacture absorbs about one-third of crop. The bottling of unfermented grape juice has been started on a large scale. Good grape land costs from \$80 to \$125 per acre.

Peaches: Trees begin to bear in four years and should last 15 years. An expert peach grower estimates cost of maintenance and profit per acre as follows: Spraying, manuring, pruning and cultivation, \$28; picking, packing and packages, \$53; hauling to station, say \$5; total cost, \$86. Returns, 700 baskets (11 quarts), at 50 cents—\$350. Net return, \$264. The average orchard will yield less than the above figures. The best varieties are the Yellow St. John, Crawford, Elberta and New Pacific. Peach-trees 100 to the acre produce fruit when four years old and yield profitably till about the fifteenth year. In 1913, 4,392 cases were exported to Great Britain.

The Niagara district is the chief peach-growing portion of the Province. Peaches are grown to some extent in the southwestern counties along Lake Erie. Lambton County has a number of young peach orchards.

Pears: Pears net the grower from \$65 to \$100 per acre. The Bartlett, Anjou, Duchess and other varieties are grown. Pears are exported to Great Britain.

Plums: The Burbank, Bradshaw, Monarch and Anjou are the leading varieties. The average net profit is \$40 to \$75 per acre. They are grown in nearly all fruit sections except the eastern part of the Province. The cultivated native plum is grown near Ottawa.

Other Fruits: Cherries, strawberries, raspberries, blackberries, gooseberries and currants yield from \$60 or \$100 up to \$500 an acre in some cases. If the tree is well covered in winter, figs will ripen in the Niagara district. Melons and citrons do well in southern Ontario.

VARIETIES OF FRUITS RECOMMENDED FOR ONTARIO

Apples

Summer: Anstrachan; adapted to all sections except the extreme north. Duchess; adapted to all sections.

Fall: Gravenstein; adapted to all sections except the St. Lawrence River and other northerly portions of the Province. Wealthy; particularly valuable for northern sections. Alexander; especially for northern districts. McIntosh; adapted especially to the St. Lawrence River district, but can be grown over a much wider area. Fameuse; adapted especially to the St. Lawrence River district, but succeeds well over a much wider area. Blenheim; adapted to all sections except the St. Lawrence River district and other northerly portions of the Province.

Winter: King; adapted only to the best apple sections, and succeeds best when top-grafted on hardy stocks. Hubbardston; adapted to the best apple sections. Greening; adapted to the best apple sections. Baldwin; succeeds best on clay

land, and is adapted to the best apple districts. Northern Spy; adapted to the best apple districts, but can be grown with success farther north by top-grafting on hardy stocks. This is also recommended for bringing it into early bearing. Cranberry; succeeds best in the eastern winter apple districts, the tree, however, being slightly tender when young. Stark; adapted to best apple districts.

Hardy Apples Recommended for Sections North of Latitude 46 Degrees

Summer: Transparent, Lowland Raspberry, Charlamoff.

Fall and Winter: Duchess, Wealthy, Hibernia, Longfield, Patten, Whitney, Hyslop, Milwaukee.

Crab Apples

Whitney; a large crab of high quality, suitable for planting in the extreme north where other

Province of Ontario

apples will not succeed. May be used for dessert or cooking. Martha; an early crab of fair quality. Transcendent; yellowish crab, season early autumn. Hyslop; dark, rich, red crab, of late season, quality only fair.

Plums

(1) The colder parts where plums are at present grown only in home gardens—a large part of Eastern Ontario and Northern Ontario. American and Niagara varieties: Cheney, Wolf, Stoddard, Hawkeye, De Soto, Quaker. The domestic varieties are a doubtful proposition, but the following are worthy of trial: Mount Royal, Penitence, Glass and Early Red.

(2) The Western part of Eastern Ontario and a large share of Western Ontario where plums are grown locally to supply the trade: Glass, Lombard, Bradshaw, Mount Royal and Shipper's Pride.

(3) The commercial districts, including Lincoln, Wentworth, some favored spots on Lake Huron and Georgian Bay and along the shores of Lake Erie and Ontario in various places: Reine Claude, Bradshaw, Damsons, Monarch, Grand Duke, German Prunes and Italian Prunes. To

this list might be added: Shiro, Burbank, Quackenbush, Lombard, Coe's Golden Drop and Smith Orleans, and for deep, dry, warm peach sills, Washington.

Red Currants: Cherry, Fay, Red Cross, Victoria, Wilder, Greenfield.

White Currants: White Grape. This species not recommended except for home use. No market for it.

Black Currants: Black Victoria, Champion, Lee, Boskoop Giant, Saunders and Naples, Kerry, Clipper, Eclipse, Climax and Collin's Prolific.

Gooseberries: Pearl, Downing, Red Jacket, Smith's Improved, Whitesmith, Industry and Keepsake, Houghton.

Grapes: Early varieties, Champion, Moore Early, Campbell Early; for main crop, Worden, Delaware, Concord, Niagara, Lindley or Rogers No. 9, Agawam-Rogers No. 15, Vergennes, Brighton.

Strawberries: Williams, Bederwood, Michel or Michel's Early, Glen Mary, Sample, Senator Dunlop, Buster, Parson's Beauty, Ruby, Splendid, Warfield, Brandywine, William Belt, Pride of Michigan, Uncle Jim.

Red Raspberry: Cuthbert, Marlboro, Herbert.

Some Fruit and Garden Returns

(From first hand information gathered by the author on the spot.)

Early Tomatoes: From two greenhouses, 186 by 20 feet, and 100 by 20 feet at Leamington, Ont., return for the season \$1,000.

Cucumbers: From greenhouse 60 by 100 feet, from middle of May to middle of July, \$1,200.

25-Acre Farm at Leamington, total year's sales of vegetables and fruit, \$4,807.

Ten-Acre Peach Farm at Grimsby. Total year's sales, \$3,105.01.

Fruit and Vegetable Farm at Clarkson, only 16 acres cropped out of 43, rest woodland and pasture. Season's profit, \$2,700 and \$3,500 in two successive years.

Fameuse Apple Orchard: Four acres on St. Lawrence. Annual average return \$200 per acre. Crop sold one year for \$1,310.

Peaches in Norfolk: 249 trees gave year's crop, \$1,300 to \$1,400.

35-Acre Apple Orchard in Lambton County gave gross return of \$10,000. Baldwin tree in this orchard produces 20 to 28 barrels yearly.

Woman Farmer: Five-acre farm at Collingwood, returns \$500 to \$1,000 a year, managed by a woman.

Poultry: The farmers of the Province are each year realizing more and more the large profits that may be made from a flock of poultry. In 1913, 6,325,007 birds were marketed for \$3,848,973. A large number of poultry associations have been organized throughout the Province for the purpose of raising the standard of poultry breeding. Ontario breeders have for many years been winning a large number of the principal prizes at the leading American Shows. At the Provincial Winter Fair held at Guelph, Ontario, each December, there is one of the greatest annual poultry shows on the continent. Last year there were

over 5,000 entries. Large quantities of poultry and eggs are shipped to the markets of Great Britain. Egg circles have been established in some districts for the stimulation of production and efficient handling. By this means the farmer has been enabled to secure from 2c to 6c per dozen more for his eggs.

Recommended Breeds of Poultry: General purpose breeds, Plymouth Rocks, Wyandottes, Rhode Island Reds, Orpingtons, Dorkings, Meat breeds, Brahmas, Langshans, Games. Special purpose white egg breeds, Leghorns, Minorcas, Anconas, Hamburgs.

Fodder Crops: Barley, clover, hay, Indian corn and mixed grains—peas, oats and barley are sown for fodder.

Grain Crops: In 1913 the total yield, and average yield per acre by bushels, as shown by threshers' measures, Dominion returns, was as follows: Spring wheat, 2,182,000 bushels from 111,000 acres, average 19.66; winter wheat, 17,689,000 from 739,000 acres, average 23.91; oats, 105,159,000 from 2,814,000 acres, average 37.37; barley, 14,589,000 from 485,000 acres, average 30.08; rye, 1,567,000 from 85,000 acres, average 18.43; buckwheat, 3,625,000 from 193,000 acres, average 19.11; peas, 3,451,000 from 190,000 acres, average 18.06; beans, 670,000 from 40,000 acres, average 16.74. Average yield in bushels per acre in the last 31 years: Spring wheat, 16; winter wheat, 21; oats, 35.6; barley, 27.8; rye, 16.4; buckwheat, 20.7; peas, 19.2; beans, 17.2.

Wheat is still a very important feature of grain growing in Ontario, the fall or winter variety being largely grown. Best yielding varieties as shown by experiments: Dawson's Golden Chaff, Imperial Amber, Early Genesee Giant, Egyptian Amber, Early Red Clawson (in order of yields). Spring wheat varieties (for flour): Saxonka, Chi-

Province of Ontario

max, Red Fife, Wellman Fife, Pringle's Champion, Minnesota No. 163, White Russian, Hungarian, show 29 to 32 bushels per acre. Colo-

rado, 26; White Fife, 27. Wild Goose (chief macaroni variety) shows 30 bushels; Arnautka, Roumania, Kubanka, 31 and 32 bushels.

Other Grain Varieties

Given in Order of Merit According to Yields

Oats (early) O. A. C. No. 3; Daubeney (late) O. A. C. No. 72, Banner. Barley (6-rowed)—O. A. C. No. 21, Mandescheuri; (two-rowed) Hanna, King. Rye—O. A. C. No. 61, Petkus. Common, Prolific, Spring. Buckwheat—Rye Buckwheat, Common Grey, Japanese, Silver Hull, New Calcutta. Peas—Early Britain, Potter, Black-eyed Marrowfat, New Canadian Beauty, White-eyed Marrowfat, Prussian Blue, Golden Vine, Multipliers. Beans—Pearce's Improved Tree, Schofield Pea, White Wonder, Medium or

Navy. Soy Beans—O. A. C. No. 81, Buckshot, Habara.

Varieties of Roots: Some of these are: Turnip (Swede)—Garton's Model, Garton's Keepwell, Bruce's Giant King, Mangels—Sutton's Mammoth Long Red, Ideal, Hartmann's Sludstrup-Barres, Yellow Leviathan, Sugar Beets—Tankard Cream, Bruce's Giant White Feeding, Rennie's Jumbo, Keith's Prize Winning Half Sugar, Steele Briggs Giant White, Rennie's Giant Half Sugar White, Rennie's Giant Sugar (20 to 24½ tons).

Field Crops—1914

Fall wheat, 15,646,000 bus.....	\$16,898,000
Spring wheat, 2,012,000 bus.....	2,153,000
Oats, 98,400,000 bus.....	48,706,000
Barley, 13,987,000 bus.....	8,952,000
Rye, 1,341,000 bus.....	1,140,000
Peas, 2,864,000 bus.....	3,780,000
Beans, 684,000 bus.....	1,532,000
Buckwheat, 4,118,000 bus.....	2,883,000
Mixed grains, 12,611,000 bus.....	7,945,000
Flax, 84,000 bus.....	143,000
Corn, 13,410,000 bus.....	9,253,000
Potatoes, 25,772,000 bus.....	12,113,000
Turnips, mangels, etc., 49,055,000 bus..	10,302,000
Hay and clover, 3,615,000 tons.....	53,900,000
Fodder corn, 2,924,000 tons.....	13,801,000
Sugar beets, 108,000 tons.....	648,000
Alfalfa, 138,000 tons.....	2,071,000

Acres Profit Competitions

These are conducted by district representatives of the Department of Agriculture. The contestants are young men who have taken short courses in agriculture. The following results, which cover all parts of the Province, will give interesting information as to varieties and yields (1914):

Potatoes: 239 bushels, cost of production \$23.67, profit \$69.49, variety Sir Walter Raleigh; 501 bushels, with cost of \$32.62, profit \$167.18, variety Dooley. Other varieties yielding well: Pearl of Savoy, Early Rose, Delaware, Carman No. 1, Green Mountain, Rural New Yorker, Empire State, Beauty of Hebron, Clark No. 1.

Oats: 48 bushels, cost \$11.75, profit \$12.25, variety Banner; largest yield 86 bushels, cost \$15.70, profit \$25.30, variety O. A. C. No. 72. Other varieties grown: Improved Scotch, Rennie's Earliest, White Wave, Silver Mine.

Peas: 38½ bushels, cost \$23.50, profit \$53.50, variety Canadian Beauty.

Turnips: 1,016 bushels, cost \$26.80, profit \$74.80, variety Rennie's Prize; Canadian Gem gave 1,030 bushels, cost \$28.30, profit \$80.70.

Mangels: 681½ bushels, cost \$30.80, profit \$50.98, variety Yellow Leviathan.

Silage Corn: 24½ tons, cost \$12.40, profit \$55.03, variety White Cap Yellow Dent. Other varieties: Australian White, Learning, Wisconsin No. 7, Longfellow.

Seed Corn: 105½ bushels, cost \$32.45, profit \$73.19, variety Longfellow. Other varieties: Bailey.

Potato Growing Contests and Results

These Were Held in Carleton and Russell Counties, Ontario, in 1913 and 1914

The average yield of the first six prize winners in Carleton County in 1913 was 320.6 bushels per acre, while that of 1914 was 353.3 bushels. In Russell County the average yield for the winners of the first six prizes in 1913 was 289 as compared with 402.9 bushels in 1914. The average net profit per acre for all competitors in Carleton and Russell counties in 1913 was \$60.78, while that in the two counties in 1914 was \$122.12. The average cost of producing one bushel of potatoes in 1913 was 34.8 cents as compared with 22 cents in 1914. The average net profit per acre of the first six prize winners in Carleton and Russell counties was \$82.33 in 1913, while that in the

same counties in 1914 was \$149.77, or \$67.44 per acre greater than in 1913.

The past three years' work in connection with these competitions have provided these very important lessons:

(1) Best results may be expected where manure is put on land the year previous and the soil fall-ploughed. This is particularly true in the case of the heavier clay soils.

(2) The value of using well-bred seed has been repeatedly demonstrated.

(3) Where the potatoes were cut into pieces about the size of a hen's egg, larger net profits per acre were realized than where whole tubers were used.

Province of Ontario

(4) Considerable evidence was adduced to show the value of sprinkling potato cuts with lime or land plaster where they could not be planted immediately after cutting.

(5) In order to use commercial fertilizers to advantage it would appear that the soil must be well prepared so as to provide it with adequate water-holding capacity. During the dry season of 1913 competitors who used fertilizers did not realize so large a net profit per acre as those who did not use them. No information is given in this report as to the value of the residue on fertilizers in succeeding years.

(6) Ploughing under of a good clover sod during the previous autumn without the application of any manure in spring would, from the reports and returns submitted, seem to be a commendable practice.

(7) Where the land was cultivated frequently after each heavy rain, higher yields and better quality were realized.

Corn Growing: Has developed rapidly in southwestern Ontario within the last few years. Essex and Kent have an organization known as the Corn Growers' Association. Lambton and Elgin counties also have local corn growers' associations which hold exhibitions and give prizes.

All these associations receive grants and other assistance from the Ontario Department of Agriculture.

In connection with the extension of markets for seed corn, exhibits have also been made, especially by Essex and Kent, and to some extent by Lambton, at the Toronto exhibition and at the Guelph winter fair. In this way an effort has been made to get in touch with the ensilage growers in other sections of the Province, and there is no doubt but that a large number of farmers are now using home-grown seed where they formerly imported seed from across the line. Every effort is being made to keep up the quality, and a few co-operative associations have been organized with this end in view. Prices have ranged from \$1 to \$3 per bushel.

Standardized Varieties

The associations have taken up the matter of standardizing varieties and seven varieties have been adopted, as follows:

Dents	Flints
Wisconsin No. 7.	Longfellow.
Golden Glow.	Compton's Early.
Whitecap Yellow Dent.	Salzer's North Dakota.
Riley.	

These seven varieties it has been felt are best adapted to this Province, and every effort is being made to secure as great uniformity as possible. District representatives are, however, conducting experiments to find what varieties are more especially adapted to different localities.

Sweet Corn Varieties: Golden Bantam is favorite early eating corn; Stowell's Evergreen best late variety.

Cattle and Dairying: Big local demand for milk and cream in towns and cities. Value of dairy products (1913), \$40,000,000. Milch cows in province, 1,141,071, other cattle, 1,460,015. Cattle

marketed in one year, 880,303, for \$38,751,801. Breeds—(1) Dairy cattle: Holstein, Ayrshire, Jersey. (2) Dual-purpose cow: Shorthorn. (3) Beef cattle: Shorthorn, Hereford, Polled Angus, Galloway.

Butter exported (1913), 7,989,269 pounds, value \$2,081,989. Latest census shows 1,077 cheese factories, which used 1,369,856,680 pounds of milk in the production of 127,123,016 pounds of cheese, valued at \$15,491,406, 157 butter plants at cheese factories, which made 1,963,768 pounds of butter, valued at \$491,448; and 120 creameries, which made 13,728,203 pounds of butter, valued at \$3,268,303. The estimated value of butter made in farm dairies, and of milk consumed on the farm, sent to condensed milk factories and supplied to towns and cities, is about \$15,000,000. Number of milch cows in Province (1914), 1,085,843, value \$69,797,983. Number of horses in Province (1914), 904,975, value \$105,393,389.

The province of Ontario is acknowledged to be the home and nursery of live stock for Canada and the greatest breeding ground for pure-bred live stock in America. Its commanding position, invigorating climate, fertile soil, pure water, nutritive grasses, grains and roots, advanced state of agriculture, and character of people guarantee that this high rank is more than likely to be upheld. Not that the quality of its animals has yet reached the standard that is desirable. Rather, the Province is advancing toward the ideal, which is to make the live stock industry the right arm of a successful agriculture. The "manufacture" of high-class animals and a wide variety are the conditions of prosperity. The quality of Ontario live stock is not only being maintained, but greatly improving every year, through the importation of large numbers of first-class horses, cattle and sheep, of both sexes. In addition, the improvement in all branches of Canadian-bred pedigreed stock during the past few years is very great, and this indicates that Ontario is destined to remain the principal supply ground for other provinces and beyond.

Sheep: Climate and soil conditions particularly favorable; good local markets; 705,848 sheep in Province (1913). Breeds: Shropshire, Leicester, Oxford, Lincoln, Cotswold, Southdown, Dorset, Hamptonshire, Suffolk. 1914 returns give 640,416 sheep, valued at \$5,571,619.

Sheep-feeding experiments conducted as illustrations throughout the Province give varying figures of profit. A few examples are: 10 grade ewes and a Southdown ram, two years' profit, \$83.83; 12 grade Leicester ewes and a Leicester ram, two years' profit, \$130.94; 10 grade Shropshire ewes and a Hampshire ram, two years' profit, \$50.64.

Swine: Sale of hogs (1913) for year, \$28,378,551. There are a number of pork factories. Yorkshire hog best for bacon. Tamworth and Berkshire also suitable. Poland-China, Duroc Jersey and Chester White are also bred. 1914 returns give number of swine 1,553,624, value \$19,606,735.

This industry is very successfully associated with dairying, the by-products—eggs, etc.—being used as food for the hogs.

Province of Ontario

Feeding Tests: At the Ontario Agricultural College, five tests were conducted in which six breeds of swine were compared as to the amount of feed required for 100 pounds gain live weight. Only the meal is considered in results given here, dairy by-products and green feed being the same in each case. The results did not give any regular precedence to any breed. A sample test record is here given:

Meal Consumed per 100 Pounds Gain in Weight

	Pounds		Pounds
Berkshire	398	Duroc-Jersey	424
Tamworth	400	Chester White	452
Poland-China	417	Yorkshire	468

Notes and Figures on Miscellaneous Agricultural Industries

Beekeeping: There are 300,000 colonies in the Province. Average production of light honey per colony, 58 pounds a year.

Maple Sugar and Syrup: Annual output, about five million pounds; average price, 10 cents per pound.

Beans: Grown largely in Essex and Kent. Crop (1913), 1,021,243 bushels; value, \$1,715,000.

Flax: Grown in western Ontario. About 7,500 acres yearly; seed, oil and fibre sold.

Tomatoes: Grown for table use in greenhouse and market garden; also extensively as a canning-factory product. Average yield, 250 bushels per acre.

Sugar Beets: Grown to supply factories at Wallaceburg and Berlin. Net profit, from \$35 to \$100 an acre. Acreage (1913), 19,083; yield, 6,389,177 bushels. Chief drawback to expansion of this industry said to be scarcity of labor.

Onions: Total acreage, 700; average yield, 312 bushels per acre. Good market, large quantities being imported.

Cabbage: Average, 10 tons per acre; cucumbers (small), 5 tons, mangels, 432 bushels; carrots, 254 bushels; turnips, 394 bushels.

Potatoes: Local supply not equal to demand. For varieties grown, see "Acre Profit Competition."

Eastern Ontario Dairy Test

A three days' milking test was held at the eastern Ontario winter fair at Ottawa during the second week of January, 1915. The championship was won by the three-year-old cow, Mercedes Lady Mechilde, owned by W. H. Cherry, Hagersville, Ontario, that gave 203 pounds of milk, testing 5.3 per cent fat.

Agricultural Education and Instruction

Elementary: The Province has a Director of Elementary Agricultural Education. Summer courses are given at Guelph for public-school teachers and certificates issued in agriculture and horticulture. Agricultural instruction in the public schools is co-ordinated with school gardening, home plot work, etc.

High School Courses: Classes are conducted at a number of high schools and collegiate institutes throughout the Province.

Rural School Fairs: This movement is rapidly developing. In 1912, 25 rural school fairs were held in 12 counties, in 1913, 69 fairs were held in 31 counties, including the children in 691 schools; there were 18,652 entries and a total attendance of 33,375. Reports for 1914 show that 148 fairs were held in 37 counties taking in the children in 1,391 schools; there were 75,602 entries and a total attendance, including children and adults, of 85,310; number of plots, 23,872, number of settings of eggs distributed, 4,074.

There are to be found at every school fair exhibits of grains, roots, vegetables, which must be produced from the seed supplied, and grown under the direction of the district representative; also poultry produced from the eggs supplied by the department; insect and weed collections, handy home devices; cooking and sewing exhibits, and essays. The children are also encouraged to exhibit calves and colts, but more emphasis is put upon the control the boy or girl has over the animal than upon the conformation or quality. Each animal must be shown on the halter and exhibited by the child. The manner in which some of the children perform with these young animals shows striking evidence of the value of this feature. A novel feature introduced at a number of fairs this year was a chicken-plucking contest, which tested the children's skill in this line and also proved very spectacular. A very interesting feature and one of undoubted value to those taking part was the public-speaking contest held at several of the fairs.

District Agricultural Representatives: These officials, numbering 41, exclusive of assistants, are agricultural college graduates who act in the capacity of representatives of the Department of Agriculture. They are distributed among various farming communities, where they give practical assistance for the improvement of farm conditions in their neighborhoods; they encourage cow-testing and improvement in the standard of live stock; give orchard and other demonstrations, test commercial fertilizers, and make drainage surveys; manage exhibits at fall fairs, and get up competitions in live-stock judging; develop a progressive county spirit, as seen in special county organizations; organize farmers' clubs, co-operative societies and other associations; attend farmers' institute meetings, and co-operate with the institute branch by holding short courses in judging stock and seed; address meetings, and distribute thousands of bulletins and newspaper articles; teach agriculture in high schools (with laboratory illustration), interest the public schools through home garden plots, school fairs, etc.

The District Offices of the Department of Agriculture with representatives in charge (1915) are located at:

Sault Ste. Marie,
Paris,
Walkerton,
Carp,
Orangeville,
Morrisburg,
Port Hope,

Gore Bay,
London,
Simcoe,
Brighton,
Whitby,
Woodstock,
Brampton,

Province of Ontario

Dutton,
Essex,
Sydenham,
Alexandria,
Markdale,
Cayuga,
Burlington,
Stirling,
Kenora,
Chatham,
Petrolia,
Berth,
Athens,
Napanee,

Norwood,
Picton,
Emo,
Renfrew,
Collingwood,
New Lisheard,
Fort William,
Port Arthur,
Lindsay,
Galt,
Welland,
Hamilton,
Newmarket.

Exhibitions: The Canadian National Exhibition, held at Toronto in August and September of each year, has exhibits of all classes of agricultural products and live stock. London and Ottawa also have large fairs. Winter fairs of live stock and poultry, horse shows, horticultural exhibitions all encourage improvement and increased production.

Other Movements and Organizations: The Agricultural and Experimental Union, farmers' institutes, women's institutes (25,000 members), farmers' clubs (over 200), agricultural societies, horticultural societies, poultry, beekeepers', plowmen's, fruit growers' and vegetable growers' associations.

Horticultural Experiment Station is located at Vineland, in the Niagara district.

Demonstration Farm at Monteith, New Ontario.

Forestry Farm: The Province has a large forestry farm in Norfolk County, where many species and varieties of trees are grown and distributed for planting throughout the Province.

Better Farming Special Trains: These trains are run through different sections of the country. The cars contain educational exhibits on field husbandry, live stock, drainage, dairying, feeds, fruit growing, poultry, beekeeping, fertilizers, concrete. A staff of demonstrators and lecturers accompanies each train. Attendance (1912), 18,000, (1913) 11,000.

Ontario Agricultural College: Situated at Guelph. Farm of 700 acres. Has all kinds of stock—beef and dairy cattle, horses, sheep, swine, poultry. Beekeeping, fruit and vegetable growing carried on. Experimental work on grain and root crops, fertilizers, insect pests, etc., are of great value. Assists in drainage work, conducts short courses, special courses for teachers. Two-year course for diploma in agriculture, four-year course for degree of B. S. A. Annual attendance, over 1,500 students, including some from countries of South America, Africa, Europe, Asia.

Macdonald Institute: Affiliated with the O. A. C. Gives courses in domestic science branches, nature study, manual training.

Ontario Veterinary College: Located on University avenue, Toronto, provides a three-year course for degree of Bachelor of Veterinary Science, a four-year course for degree of Doctor of Veterinary Science.

Free Agricultural Bulletins

Write to Department of Agriculture, Parliament Buildings, Toronto, Ont. (A charge of 5 cents is made for each bulletin if sent outside of Canada.) The Teeth and Their Care; Beekeeping in Ontario; Notes on Cheddar Cheese-making; Uses of Vegetables, Fruits and Honey; Little Peach Disease; Children: Care and Training; The Codling Moth; Weeds of Ontario (No. 128 revised); Farm Poultry (No. 151 revised); Bee Diseases in Ontario; Agricultural Co-operation; Tuberculosis of Fowls; Apple Orchard; Insecticides and Fungicides (No. 154 revised); Tomatoes; Lime-Sulphur Wash; Onions; Fruit Juices; Peach Growing in Ontario; Peach Diseases; Grape Growing in Niagara Peninsula; Cabbage and Cauliflower; Decay of the Teeth; Dairy School Bulletin (No. 172 revised), I. Cheese Making and Butter Making; Dairy School Bulletin (No. 173 revised), II. Dairying on the Farm; Ice-Cold Storage on the Farm; Farm Poultry and Egg Marketing Conditions in Ontario County; Farm Forestry (No. 155 revised); Strawberry Culture and the Red Raspberry; Fruits Recommended for Ontario Planters (No. 179 revised); Orchard Surveys in Dundas, Stormont and Glengarry; Sheep Raising in Ontario; Does It Pay? Demonstration Lectures in Domestic Science, Sewing and Nursing; Box Packing of Apples; Farm Poultry (No. 189 revised); Birds of Ontario (No. 173 revised); The San Jose and Oyster-shell Scales; Lightning

Rods; Food Value of Milk and Its Products; Currants and Gooseberries; Fertilizers; Greenhouse Construction; Swine; Plum Culture in Ontario; Cherry Fruit-Flies; Farm Crops; Experiments at O. A. C.

Education: The Province has a complete system of elementary and secondary schools. Industrial, technical and art schools are established in various centres. Normal schools for teachers, at Toronto, Ottawa, London, Hamilton, Peterborough, Stratford and North Bay. Faculties of education at the University of Toronto and Queen's University, Kingston.

The University of Toronto has over 4,000 students.

Federated with the University of Toronto are Victoria University, Trinity University, Knox College, Wycliffe College and St. Michael's College.

Affiliated with it are Albert College, Ontario Agricultural College, Ontario Medical College for Women, Royal College of Dental Surgeons, Toronto College of Music, Ontario College of Pharmacy, Toronto Conservatory of Music, Hamilton Conservatory of Music, Western Canada College of Calgary, Columbia Methodist College, Ontario Veterinary College, and others.

Besides the University of Toronto, the other un denominational universities are Queen's University, Kingston, and the Western University, London.

Province of Ontario

The denominational universities are Victoria (Methodist), Toronto; Trinity (Episcopalian), Toronto; Ottawa (Roman Catholic), Ottawa and McMaster (Baptist), Toronto.

The Ontario College of Art, one school of dairying and two schools of mining receive government aid.

Endowed schools and colleges, some of them denominational, are in various places throughout the Province. Among them are: Upper Canada College and St. Andrew's College, both residential schools for boys.

Transportation: The Province has splendid water routes, including the Great Lakes, rivers and canal systems. All the larger railway systems pass through the Province. There are many electric railways. Special work is being done in the way of "good roads" and colonization roads.

Mineral Production: Is very extensive. Year's output (1913), \$53,331,647. Includes arsenic, cement, clay, cobalt, copper, corundum, feldspar, gold, granite, graphite, gypsum, iron, iron pyrites, marble, mica, natural gas, nickel (70 per cent of world's output), peat, petroleum, platinum, palladium, quartz, salt, silver, sodalite, sulphur, talc, zinc.

Fisheries: The Great Lakes are the largest fresh-water fisheries in the world. The regular fisheries cover Lakes Superior, Huron, Erie and Ontario, Georgian Bay, Lake of the Woods and Rainy River, Lake St. Clair and River Thames, and certain inland waters chiefly in Old Ontario. The principal fish taken are herring, in Lakes Erie, Ontario and Superior; trout, in Lakes Huron and Superior, and in Georgian Bay; whitefish, in Lakes Erie, Huron and Ontario, and in Lake of the Woods and Rainy River; pickerel, in Lakes Erie and Huron, and in Lake of the Woods and Rainy River; pike, in Lakes Erie and Ontario, and in Lake of the Woods and Rainy River; sturgeon, in Lake of the Woods and Rainy River, Lake Erie, Lake St. Clair and River Thames. Value of fisheries (1911), \$2,419,178.

In 1911 there were employed 666 men on 156 tugs of 12,074 tonnage and 2,740 men on 1,578 boats. The total value of fishing apparatus was \$1,258,959.

Forests: The forest area, not counting the new district of Patricia, is 102,000 square miles. North of the C. P. Railway are about 60 million acres covered by spruce, jack pine and poplar. Red and white pine are found in large quantities in the Temagami Forest Reserve around the shores of Lakes Temagami and Lady Evelyn; along the Montreal, Sturgeon and Wahnapiatae rivers and their tributaries; in the Mississauga Reserve, on the river bearing the same name and along its numerous tributaries; in the dis-

trict of Rainy River, along the Minnesota boundary, extending from Rainy Lake to Hunters' Island, and in small groves throughout the Sudbury district as far north as Fort Mettagami. The stand of white and red pine still vested in the crown, on unlicensed lands, is estimated at over 12 billion feet b. m. Pulpwood standing on crown lands undisposed of is estimated at 250 million cords. The forests surround a network of lakes and many rivers, which afford abundant water-power.

Crown Lands Regulations

Agricultural lands open for disposal in New Ontario may be obtained by:

(1) **Purchase:** 160 acres may be sold to each applicant, who must be a male or sole female head of a family, or a single man of 18 years. The price is 50 cents an acre, payable one-fourth cash, balance in three annual instalments with interest at 6 per cent. Purchaser must go into actual residence within six months of date of purchase, erect a habitable house at least 16x20 feet, clear and cultivate 10 per cent of the area, and reside on the land for three years before patent issues. After the issue of patent another 160 acres may be purchased on like conditions. Proxy regulations permit a purchaser to place a representative on the land to perform settlement duties, but require double the amount of clearance and cultivation.

(2) **Free Grant:** Except in the Temiskaming district, certain lands considered suitable for cultivation and not valuable chiefly for pine timber or minerals may be located as free grants. A single man over 18, or head of a family, may locate 160 acres, and the latter may purchase an additional 80 acres at 50 cents per acre cash. In St. Joseph's Island and the townships of Bonfield, Calvin, Cameron, Ferris, Mattawan and Papineau in Nipissing district, and Paipoonge in Thunder Bay, a single man may secure 100 acres free, a head of a family may locate 200 acres and buy an additional 100 acres; a single man may locate 100 acres and may swear off for rock and swamp up to 100 acres.

The conditions entitling a locatee to patent are: (a) Clearing and cultivating 15 acres, of which at least two acres must be done each year; (b) erection of a habitable house at least 16x20 feet; (c) continuous residence and cultivation for three years after location and thence to the issue of patent. Absence for not more than six months altogether in any one year may be allowed if sufficient reason is shown.

For information regarding any of these lands, write to the Director of Colonization, Parliament Buildings, Toronto, Ontario.

PROVINCE OF MANITOBA

Counties of Manitoba. Population, 1911

Brandon	28,724
Dauphin	44,888
Eggar	23,591
Macdonald	35,341
Marquette	23,588
Portage la Prairie	27,958
Provencher	4,000
Selkirk	53,091
Souris	29,048
Winnipeg*	128,187

* Exclusive of city of Winnipeg.

CITIES, TOWNS AND VILLAGES OF MANITOBA

200 Population or Over
1911 Census

A	
Alexander	300
Altona	400
Ardan	200
Austin	250
B	
Baldur	400
Beauséjour	347
Bellmont	300
Benito	200
Binnearth	250
Birtle	450
Bolshevik	918
Brandon	13,833

C	
Carberry	578
Carman	1,284
Cartwright	200
Crystal City	200
Cypress River	400
D	
Dauphin	2,915
Deloraine	208
Dominion City	225
Dunrea	200
E	
Elgin	350
Elkhorn	574
Elm Creek	250
Emerson	1,043
G	
Garson	200
Gilbert Plains	342
Gimli	494
Gladstone	782
Glenboro	350
Grandview	337
Gresham	319
Griewood	200
H	
Hamiota	565
Hartney	623
Holland	400
I	
Inkster	200
K	
Killarney	1,010

L	
La Rivière	200
Lauder	200
Letellier	223
M	
McGregor	450
Manitou	638
Melita	200
Miami	350
Miniota	300
Minnedosa	1,484
Morden	1,130
Morris	500
N	
Napinka	326
Neepawa	1,263
Newdale	200
Ninga	300
Norwood Grove	5,000
O	
Oak Lake	449
Oak River	200
P	
Pierson	200
Pilot Mound	458
Plumas	273
Plum Coulee	200
Portage la Prairie	3,885
R	
Rapid City	580
Rathwell	200
Reston	200

Rivers	
Roblin	680
Roblin	250
Roland	500
Rosenfeld	200
Russell	543
S	
St. Boniface	7,478
St. Charles	200
St. Anne des Chenes	200
St. Jean Baptiste	350
St. Pierre	200
Selkirk	2,990
Shoal Lake	591
Somersby	250
Souris	1,834
Stone wall	1,005
Stony Mountain	200
Strathclair	200
Swan Lake	200
Swan River	317
T	
Transcona	300
Treherne	600
Tyndall	200
V	
Virden	1,580
W	
Waskada	200
Wawanesa	350
Winkler	450
WINNIPEG	135,430
Winnipeg Beach	244
Winnipegosis	300

PROVINCE OF MANITOBA

Area, 244,613 acres. Population, 455,614. Capital, Winnipeg. Lieutenant Governor, Douglas Colin Cameron. Premier, Hon. T. C. Norris

Historical Notes

Perhaps the most fascinating pages in the history of Canada are those which have to do with the great fur trade of the early days. Had it not been for Pierre Radisson, the bold and erratic adventurer, who knows who would be owners of Western Canada today?

This wily Frenchman saw in the region about Hudson Bay (for whose discovery poor Henry Hudson in 1610 had yielded up his life) a mine of wealth in furs and sought assistance in exploiting it by approaching the French court. Repulsed there he turned to his English friends and by royal charter from King Charles and with the aid of Prince Rupert, he organized the Hudson Bay Company—a company with a blanket charter that subsequently covered a vast empire.

On the Red River in 1812, Lord Selkirk, the indefatigable colonist, settled a body of people from northernmost Scotland. This settlement was for a time the storm centre of quarrels between the rival fur companies—the Hudson Bay and the Norwesters. Finally these joined forces and in 1868 the newly organized Dominion of Canada purchased from the Hudson Bay Co. the vast northwestern region for one and one-half million dollars, the company retaining two sections of land in each township. By the Manitoba

Act of 1870 this Province became a part of Canada. The ill-advised Riel rebellion of 1869 was one of the unfortunate happenings arising out of the annexation of this territory.

Physical Features, Soil, Climate

Soil and Surface: The surface of Manitoba is not a flat, bare stretch, a "bald-headed prairie." A large part of the land, especially in the south, is flat, being, geologists say, the bed of a wide, prehistoric lake. But even in the southwest the land rises into wooded hills, and in the southeast, close to the Lake-of-the-Woods country, there is a genuine forest. Down through the heart of the Province stretch two great lake chains, Lake Winnipeg and lakes Winnipegosis and Manitoba. These receive as tribute the waters of the Saskatchewan and Assiniboine west, and discharge through the Nelson River to Hudson Bay. Sloping to the west from the Lake Manitoba plain is a range of hills known as the Duck Mountains, Riding Mountains, and the Porcupine Hills. These hills are modest in their height, have a gentle slope, and in no way interfere with the fact that almost the whole land surface of Manitoba west of its great lakes is ready for cultivation. Manitoba soil is a deep,

Province of Manitoba

rich loam, inexhaustible in its productiveness; it is essentially agricultural.

Rivers and Lakes: The Province is served by the natural drainage system making into Hudson Bay by way of Lake Winnipeg. The rivers run from the eastern and western sides to the lower lands in the centre, and practically all of the drainage of the Province reaches the sea by the rivers making out of the natural reservoir of Lake Winnipeg. The chief rivers are the Red, Assiniboine, Winnipeg, and Pembina, all of which have important tributaries, except the Winnipeg. The rivers are not rapid, but there is force enough in the Winnipeg to supply electric power for tramways and industrial purposes for many cities as large as Winnipeg.

Forest Wealth: For those who love timber-covered areas, Manitoba can point to a strip along its east boundary, approximately eighty miles wide, of spruce, birch, and tamarack, which extends into the extreme east of the Province from the wooded lands of New Ontario. Large sawmills are established. In Western Manitoba are forest areas, and timbered districts exist on the Turtle Mountains and the Brandon Hills. The true forest persists in Northwestern Mani-

toba as far as the Duck Mountains. From all these points quantities of lumber, fence posts, and firewood are sent to the prairie settlers, and the rivers and lakes are skirted by a plentiful tree growth.

Climate: Climate conditions are uniform throughout the Province. There is much sunshine. Summers are warm. Winter starts suddenly in November or December. The cold is steady, with a clear, dry atmosphere. Snow on the prairie averages 1 ft. deep. Chief rainfall is in June. The mean annual temperature at different points is as follows: Brandon, 33.9; Channel Island, 30.9; Elkhorn, 33.7; Emerson, 35.9; Hillview, 32.7; Minnedosa, 34.1; Portage la Prairie, 35.2; Russell, 31.3; Sourisford, 33.8; St. Albans, 31.4; Stony Mountain, 33.8; Treherne, 34.9; Winnipeg, 34.9. Average temperature 1914 was 36.2.

Rainfall: The average annual rainfall in inches at different points is as follows: Brandon, 17; Channel Island, 17; Elkhorn, 17; Emerson, 22; Hillview, 22; Minnedosa, 17; Portage la Prairie, 17; Russell, 17; Sourisford, 14; St. Albans, 17; Treherne, 17; Winnipeg, 21. Average rainfall 1914 was 19.75 inches.

Agricultural Industries and Opportunities

Grain: While Manitoba is gradually developing "mixed farming," the production of wheat and other grains is very great. The yield for 1914 was as follows:

	Area, acres	Average yield, bushels	Total yield, bushels
Spring wheat	3,338,572	15.0	51,947,608
Fall wheat	27,628	19.7	544,271
All wheat	3,366,200	15.6	52,491,879
Oats	2,064,114	20.0	62,034,688
Barley	1,187,136	20.0	23,866,098
Flax	100,191	10.0	1,001,910
Rye	10,138	17.0	172,326
Peas	3,742	16.0	59,872
Total	6,731,521		139,626,753

The leading varieties of spring wheat are Red Fife and Marquis, which grade "Manitoba Hard." The Marquis matures about 15 days earlier than the Red Fife. Fall or Winter wheat is sown in August, grows to 6 or 8 inches in the fall and is cut from 1st to 15th of August. Leading variety, Alberta Red.

Fodder Crops—1914

Crop	Area, acres	Average yield, tons	Total yield, tons
Brome grass	25,444	1.9	48,344
Rye grass	17,100	1.8	30,780
Timothy	165,990	1.7	282,183
Clover	7,212	1.7	12,261
Alfalfa	10,250	2.3	23,575
Fodder corn	30,430	5.4	164,322

Dairying: Is a very important industry; good prices are obtained; the quality is excellent in color and flavor. Abundant grasses are rich in the fattening properties essential to raising cattle and producing butter and cheese. Government dairy schools promote these industries.

Dairy Returns for 1914

Product	Pounds	Price, cents	Total value
Dairy butter	3,889,000	22.5	\$ 875,025.00
Creamery butter	4,761,355	26.5	1,261,750.07
Cheese	471,355	14.0	65,989.70
Total	9,121,710		\$2,202,773.77
Milk	48,925,000	2.0	978,500.00
Sweet cream	737,838	32.0*	236,108.16

\$3,417,381.93

Local Market for Produce: Customs returns show that during the year ending March 31, 1913, Manitoba imported 1,596,480 dozen eggs, valued at \$314,121. It took 64 cars to bring in the dressed poultry required over and above all local supply, representing a value of about \$243,000. Approximately 2,000,000 pounds of butter were received at Winnipeg from the United States and Eastern Canada during 1912, a value of \$560,000. Winnipeg creamery companies paid \$120,000 for milk and cream from two Minnesota cities alone. The customs receipts for imported bacon and hams amounted to nearly 5,000,000 pounds, worth \$573,569. Canned tomatoes came in at the rate of 238,292 pounds, while 18,722 bushels of potatoes were brought into the province, and vegetables of other kinds to the value of \$76,233.

* This price is per pound of butter fat.

Province of Manitoba

Livestock Sold in 1914

	Number	Value
Horses	316,707	41,934,302
Milch cows	156,306	9,675,341
Other cattle	251,996	10,369,635
Sheep	45,303	396,854
Swine	186,276	2,034,134

Poultry Sold: (1914) turkeys, 184,236; geese, 81,720; chickens, 815,892.

Expenditure for farm buildings (1914) was \$3,387,395.

Breeds of Horses raised are Clydesdale, Percheron, Shires and Standard Bred horses.

Breeds of Poultry: Of hens, Plymouth Rocks, Wyandottes, Rhode Island Reds and Orpingtons are best adapted to withstand the Western winter; of ducks, the Pekin, Rouen and Indian Runner do best; of geese, the Embden and Toulouse, and of turkeys, the Mammoth Bronze are the most commonly raised.

Roots and Vegetables: Potatoes, parsnips, carrots, cucumbers, cabbages and cauliflowers grow to a very large size. Root crops are not largely grown for feed.

Returns for 1914

	Area, acres	Average yield, bushels	Total yield, bushels
Potatoes	60,484	140.4	8,494,104
Roots	17,606	190.9	3,351,742

Poultry Possibilities: At all times the market for poultry and eggs is unsatisfied in Manitoba, and during the winter months absolutely new-laid eggs are absorbed so rapidly that they are practically unobtainable. Egg prices begin to rise quickly in October and from then on take wings and soar. The following wholesale prices for poultry products were paid on Winnipeg markets during the latter part of November:

Eggs, new-laid.....	60c per dozen
Eggs, good.....	30c-33c per dozen
Roasters and broilers.....	25c per pound
Ducks, etc.....	25c per pound

Crop Returns in 1914

Fall wheat	240,000 bus...	\$ 214,000
Spring wheat	38,365,000 bus...	38,749,000
Oats	31,951,000 bus...	15,336,000
Barley	9,828,000 bus...	5,405,000
Rye	100,000 bus...	90,000
Mixed grains	80,000 bus...	14,400
Flax	338,000 bus...	372,000
Potatoes	3,172,000 bus...	2,284,000
Turnips, mangels, etc..	1,047,000 bus...	565,000
Hay and clover.....	201,000 tons...	1,833,000
Fodder corn	72,000 tons...	547,000
Alfalfa	9,000 tons...	119,000

Alfalfa: The Department of Agriculture has established 20 demonstration plots of half an acre each and upward in various parts of the Province, with satisfactory results in every case. Many farmers are making this crop one of their

Market Gardening has big possibilities here. Onions, celery, cabbage, cauliflower, potatoes, etc., are imported in large quantities. All kinds of vegetables except beans and celery can be grown with great ease. A very complete list of varieties of vegetables suitable for Manitoba is given in bulletin on "Farm Garden." See list of free bulletins on another page.

One market gardener near Winnipeg produced \$350 worth of pickling onions on half an acre. The contract price for pickling onions is 3½ cents per pound. The bulk of the cauliflower crop near Winnipeg is sold for pickling and the price runs up to \$45 per ton, or from \$225 to \$360 per acre. One-half acre of cabbages, a gross feeder among plants, recently yielded its owner \$550 on ground that had not been "fertilized" for 17 years.

Apples: The Manitoba apple was born seven miles from the town of Morden some years ago. It was fathered by hundreds of experiments with stock from all parts of the world.

Among the Manitoba apples is one which ripens about the end of July. It is a handsome yellow, sweet apple, known as the Repka Kaslava. There is also an early white apple with a delicate flush on its cheek, the Blush Calvil. Another very successful apple is called the Charlemoff; it is a medium early product, red striped, of good texture and pleasant flavor, and is one of the largest grown in the orchard. The Anisette is a pretty red fall apple. The Hibernia is a winter apple of exceptional keeping qualities, while the Austerhoff, a late winter apple, carries well along into spring. Another winter apple is the Antinofka, yellow in color and similar to the Golden Pippin.

Cherries: Several varieties of cherries with which experiments have been made have proved successful, and are evidently here to stay.

Other Fruits: Besides apples and cherries, several varieties of plum trees bear fruit in Manitoba, while all manner of small fruits are a very big success in most parts of the Province. The quality of Manitoba raspberries, black, white and red currants, etc., is very high and in many parts, particularly to the north, berries of all kinds grow wild.

staple products. Apart from its value as a cured fodder it forms a most desirable pasture.

Beekeeping: The luxuriant vegetation, and the increasing cultivation of a number of varieties of clover, make bee culture easy and profitable. The market is large in the home cities.

Railroads: The growing and marketing of grain are the chief industries of Manitoba, and the extension of the railways goes hand in hand with the development of the land. Few farmers are more than eight or ten miles from a railway.

Game and Fish: Manitoba's annual fishery output represents a value of over one million dollars, most of this being realized from the lucrative whitefish. Wild ducks, geese and swan haunt the lakes and rivers, while on the prairies are flocks of prairie chicken. On the hills and

Province of Manitoba

in the woodland moose and deer abound, and there are wolf, bear, lynx, fox, marten, beaver and other fur-bearing animals.

Available Homesteads: Manitoba has one and one-half million acres of land available for free homesteading, located east of the Red River, and between lakes Winnipeg and Manitoba. To those who appreciate the picturesque advantage of tree growth, these districts make strong appeal. If the timber is a light scrub, it is easily removed; if, on the other hand, the forest is

heavy, it richly repays the cost of clearing. Creeks, lakes and rivers abound, while water for domestic purposes can generally be secured by sinking wells to a moderate depth. See Homestead Regulations for Manitoba, Alberta and Saskatchewan.

Telephones: The Government of Manitoba owns and operates the telephone system of the Province. There are now over 5,000 miles of long-distance lines, and about 9,000 rural subscribers.

Agricultural Education and Instruction

Alfalfa: 18 demonstration plots established by government.

Dairy Instruction: 100 dairy and mixed-farming meetings held in Ruthenian Colonies.

Better Farming Demonstration Trains are sent out over railway lines. Besides the accommodation cars for the staff of lecturers, crew, etc., the trains consist of fully-equipped cars representing Livestock, Field Crops, Farm Mechanics, Home Economics, Poultry, Dairy, etc. Trains carry samples of weeds, grains, fodders, and the lecture equipment. A special dairy car was carried on one while a demonstration feature was made of the Farm Mechanics on another. Trains were manned by members of the staff of the Manitoba Agricultural College.

Mixed Farming cars are provided with lantern slides illustrating every branch of agriculture.

Drainage: Little tile drainage has been done

in Manitoba and experiments are being conducted to secure necessary data as to its use.

Manitoba Boys' and Girls' Club: A number of branches are being formed. Fairs are held at which chickens, potatoes, corn, etc., produced by the boys and girls, are placed on exhibition.

Other Agricultural Movements of the Province: Agricultural society fairs, agricultural and arts associations, seed fairs and poultry shows, better farming short courses, home economics societies.

Manitoba Agricultural College: Located at St. Vital, south of Winnipeg, occupies farm of 437 acres. Attendance 338 in regular winter courses, 600 in short courses. Has boys' and girls' residences, school buildings, barns, etc.; cost \$3,000,000; 35 instructors; gives 3-year course for diploma in Agriculture; 5-year course for degree of B. S. A.; 2-year course in Home Economics.

District Representatives

The Hon. George Lawrence, Minister of Agriculture for Manitoba, has announced that his department will place fifteen agricultural field instructors in the various districts throughout the Province this spring. It is the intention of

the department to have a district allotted to each man, and to have these men visit the farmers and assist them with the problems that arise on their own farms.

Free Agricultural Bulletins

Prepared by Manitoba Agricultural College, Winnipeg, Canada, 25,000 distributed in 1914.

1. Classification of the Horse. 2. Twelve Noxious Weeds. 3. Care of Milk and Cream. 4. The Protection of Farm Buildings from Lightning. 5. The Farm Garden. 6. Farm Poultry in Manitoba. 7. Hog Raising in Manitoba. 8. Cow Testing. 9. Repairing Farm Equipment and Roads. 10. Plans for Farm Buildings. 11. Canning and Preserving. 12. The Farm Flock. 13. Barn Ventilation. Copies of these bulletins may be had free by addressing the Agricultural College, Winnipeg, Canada.

Education: A school district may be formed as

soon as there are ten children of school age in a section. The Government grants to public schools consist of 65c per day for 200 days' operation each year. In a number of cases the rural districts have been consolidated and children are conveyed to the schools from their homes. Greater efficiency is thus secured.

The Province has many fully equipped secondary schools—High Schools, Collegiate Institutes, etc.

Manitoba University, Winnipeg, provides courses in Arts and Sciences, Engineering and Architecture, Medicine, Law, Pharmacy.

How to Get a Farm in Manitoba

See Homestead Regulations and Regulations Regarding Sale of Dominion School Lands in Manitoba, Saskatchewan and Alberta, page 55.

PROVINCE OF SASKATCHEWAN

DISTRICTS OF SASKATCHEWAN

Population, 1911 Census.

Assiniboia	42,556
Battleford	47,073
Humboldt	52,195
Mackenzie	40,558
Moosjaw	57,795
Prince Albert	36,319
Qu'Appelle	35,608
Regina	70,556
Saltcoats	28,095
Saskatoon	51,145

CITIES, TOWNS AND VILLAGES OF SASKATCHEWAN.

Population, 1911 Census.

A	
Aberdeen	240
Albion	252
Alma	73
Alameda	283
Alton	139
Alaska	200
Antler	150
Arco	200
Asquith	200
Atwater	57
Aylesbury	73

B	
Bilcarres	344
Bulgonie	368
Burrows	350
Battleford	1,331
Belle Plain	57
Bigger	315
Birch Hills	145
Birmingham	31
Bladworth	164
Borden	90
Broadview	702
Brock	117
Broderick	180
Brownlee	171
Bruno	37
Buchanan	228
Bulyea	117

C	
Candiac	30
Canora	426
Carleton	188
Carlyle	358
Carleton Place	469
Carleton Place	322
Churchbridge	30
Clavet	37
Coblenz	83
Craig	435
Craven	74
Creelman	100
Cupar	221

D	
Dana	85
Davidson	389
Deleale	235
Deleale	89
Disley	99
Drake	66
Drinkwater	225
Dubuc	161
Duck Lake	768
Dundurn	239

E	
Earl Grey	154
Edam	53
Elbow	221
Elfron	103
Elstow	114
Esterhazy	358
Estevan	1,923
Eyebrook	182

F	
Fairlight	96
Fenwood	51
Felding	51
Fillmore	157
Fleming	267
Foam Lake	183
Forget	267
Fort Qu'Appelle	285
Francis	293

G	
Gainsboro	247
Glenora	130
Glen Ewen	168
Govan	390
Grand Coulee	82
Grayson	201
Grenfell	709
Griffin	109
Gull Lake	606

H	
Hague	300
Halbrite	239
Hanley	391
Harris	106
Hawarden	120
Herbert	200
Heward	132
Howell	122
Hudson Bay Jet	215
Humboldt	859
Hurburt	559

I	
Imperial	250
Indian Head	1,285
Iturna	94

J	
Jansen	63
Jasmin	130

K	
Kamsack	473
Keeler	74
Kelliher	220
Kenaston	185
Kennedy	164

Kerr Robert	250
Killaly	92
Kindersley	456
Kinistino	166
Kinley	51
Kipling	237
Kisbey	269

L	
Lampman	96
Lang	301
Langenburg	230
Langham	386
Langman	392
Lashburn	232
Lemay	303
Lele	57
Lele	126
Lipton	273
Lloydminster	441
Lockwood	101
Loreburn	135
Lumsden	695

M	
McTaggart	134
Macklin	322
Macoun	187
Maidstone	92
Manor	289
Maple Creek	336
Marquis	88
Maryfield	209
Maymont	118
Melfort	599
Melville	1,816
Mildale	156
Milestone	436
Montmartre	201
Moosjaw	13,833
Moosomin	1,143
Morse	571
Mortlach	219
Muenster	52

N	
Netherhill	78
Neudorf	325
Nkomis	374
North Battleford	3,105
North Portal	296

O	
Ogema	300
Oiler	62
Outlook	679
Oxbow	630

P	
Paynton	131
Penae	230
Perdue	153
Prince Albert	6,254
Punnichy	73

Q	
Qu'Appelle Sta.	850
Quill Lake	163
Quinton	76

R	
Radisson	305
Raymore	126
Redvers	200

REGINA	
Rocanville	264
Roche Perce	250
Roche Perle	163
Rosetown	217
Roshtern	1,172
Rouleau	490

S	
Saltcoats	439
Saskatoon	12,002
Scott	420
Sedley	221
Sheno	107
Sintaluta	291
Southey	157
Springdale	123
Spyhill	71
Star City	84
Stockholm	150
Stoughton	311
Strasbourg	311
Summerbury	79
Swift Current	1,853

T	
Tantallon	115
ate	48
Taylorton	350
Tessier	87
Theodore	193
Tisdale	250
Togo	111
Tugaske	200
Tuxford	121
Tyvan	164

U	
Unity	140

V	
Venn	58
Viscount	72
Vonda	270

W	
Wadena	255
Waldron	114
Wapella	485
Warman	149
Watrous	781
Watson	211
Wauchope	127
Wawota	206
Webb	70
Weyburn	159
Weyburn	2,210
Whitewood	447
Wilcox	268
Wilkie	537
Windthorst	208
Wolsley	941
Wynyard	515

Y	
Yellow Grass	450
Yorkton	2,302
Young	82

Z	
Zealandia	264
Zelma	43

PROVINCE OF SASKATCHEWAN

Area, 161,088,000 Acres. Population, 492,432. Capital, Regina. Lieutenant Governor, Hon. George W. Brown. Premier, Hon. Walter Scott

Historical Note

The region north and west of Manitoba as far as the Rocky Mountains has been known until recent years as the Northwest Territory. This was included in the purchase from the Hudson's Bay Company, which is explained in note on Manitoba. Up to 1876 this was governed by the Lieutenant Governor of Manitoba and a small council of

eleven members. It was then given a lieutenant governor and a council of five members. Battleford was the seat of the government until 1883, when Regina was chosen. In 1888 the Territories were given an elected assembly of 22 members. Later the four districts of Alberta, Assiniboia, Athabasca and Saskatchewan were formed, but in 1905 this territory was again reorganized into the two provinces Alberta and Saskatchewan.

Province of Saskatchewan

Location and Extent

This Province lies between the 49th and 60th parallels of north latitude, and between the meridians of 102 and 110 degrees west from Greenwich. The southern border is the International Boundary, the dividing line between Canada and the United States. South of Saskatchewan are the States of North Dakota and Montana; east of it is the Province of Manitoba; west of it is the Province of Alberta, and on the north it is

bounded by the unorganized Northwest Territories. Its greatest length is 760 miles; and its width on the south is 393 miles. At the middle it is 300 miles wide, and at the northern boundary it has a width of 277 miles. The area of this great quadrangle is 250,650 square miles of which 8,318 square miles is water. The land surface contains 155,032,480 acres.

Natural Divisions

The Plains: In the south, and extending as far north as Saskatoon, with the exception of a considerable district north of the Qu'Appelle Valley comprising the Beaver Hills, Touchwood Hills, etc., the country consists of open rolling prairie, gently rolling plains dotted here and there with placid lakes and clumps of trees with occasional stretches of open level prairie, where the plain as far as the eye can reach is unbroken by slope or declivity and the gaze is unobstructed by even a single tree.

There are, however, in different parts of these divisions ranges of low hills intersected by ravines, many of which are well wooded and supply considerable quantities of fuel. The most important are: The Coteau, including the Dirt Hills, which extends from the International Boundary west of Estevan to a point beyond the Elbow of the Saskatchewan River; Moose Mountain, north of Arcola; Last Mountain, Touchwood and Beaver Hills, north of Qu'Appelle Valley.

The Park Country: North of Saskatoon and extending to the southern edge of the great northern forest which, in Saskatchewan, is bounded on the south by a line passing from Saw River northwesterly through the vicinity of Prince Albert, the country is mixed prairie and woodland, and is splendidly adapted for mixed farming and for stock raising. As a home-making proposition, this part of Saskatchewan stands unequalled. Portions of the more heavily wooded area in the park country have been reserved from settlement by the Government in order to provide timber and game preserves.

The Ranching Country: That lying to the west is perhaps the most suitable part of the province for ranching. In the districts west of the Coteau and south of the South Saskatchewan River the stockmen have until recently been permitted to

pasture their herds in peace and were but little interested in the invasion of the homesteader. The domain of "King Wheat" has, however, gradually been extended and the arable areas are being made to yield their generous tribute of golden grain. The Cypress Hills, Wood Mountain, the Coteau and the more hilly areas intervening will, however, always be the secure retreat of the rancher. There he may continue to produce some of the finest horses, sheep and beef cattle in the world.

The Northern Forest: North of the belt of mixed prairie and woodland, lies the great northern forest, the northern edge of which may be described by a line drawn from the northern part of Reindeer Lake to the southern part of Lake Athabasca. This timbered belt is covered with a forest of spruce, tamarack, jack pine, poplar and birch.

The remainder of this area is not thickly wooded, although black spruce, pine and poplar are found in the extreme northern parts of the Province.

River Ways: The chief rivers are the North Saskatchewan, South Saskatchewan, Qu'Appelle, and Carrot. The North and South Saskatchewan both rise in the Rocky Mountains and each has a general easterly trend. The Red Deer flows into the South Saskatchewan, about 150 miles north of the United States boundary. The South Saskatchewan runs east nearly half-way across the Province, then turns north and enters the North Saskatchewan River a little east of the town of Prince Albert. The South Saskatchewan River, with the Qu'Appelle, intersects the Province from east to west. The Carrot rises south of Prince Albert and runs an approximate parallel line to the North Saskatchewan, into which it flows near "The Pas," a Hudson Bay Company trading post.

Rainfall and Temperatures

The average annual precipitation, on the basis of ten years' calculations, is slightly over 17 inches. Two thirds of the annual precipitation occur between April and September.

Average mean temperature during past ten years, 34.4. Average mean temperature during

1912, 32.7. Average mean temperature, April to September, 1912, 52.3. Average for 1914, 35.4.

Precipitation during 1912, 16.66. Precipitation, April-September, 1912, 12.92. Precipitation, April-September, 1913, 11.17. Average for 1914 was 13.07 inches.

Province of Saskatchewan

Agricultural Facts

Saskatchewan raises annually over 10,000,000 bushels more wheat than the rest of Canada combined.

Produced 660,000,000 bushels of wheat in the past twelve years.

Grain production in 1912, 237,278,000 bushels, in 1913, 243,513,000 bushels.

Total elevator capacity, 40,000,000 bushels.

Grain storage facilities include half the elevators in the west.

Value of grain products in 1913, \$110,208,000.

Value of wheat products in 1913, \$70,792,000.

Eighty-seven per cent of territory still available for settlement.

Average wheat yield for the past ten years ex-

ceeds that of the United States for the same period by over five bushels to the acre.

Fifty million acres capable of raising an average of 20 bushels per acre highest contract grades.

Varieties of Wheat: Red Fife and Marquis (Spring); Alberta Red (winter).

Comparison of Acreages

	1900	1910	1913	1914
Wheat	382,540	4,644,834	5,760,249	5,344,000
Oats	96,173	2,042,607	2,638,562	2,520,000
Barley	8,303	234,394	307,177	290,000
Flax	16,694	396,230	976,137	958,000

Stock Raising

Horses: Breeds raised are Clydesdales, Percheron, Suffolk Punch, Shires and some Thoroughbreds. Number in Province (1914) 609,521. Increased from 83,000 in 1901. Value \$90,026,252.

Cattle: 204,624 milch cows and 474,436 other cattle (1914). Increase from 56,000 milch cows and 160,000 other classes of cattle in 1901. Values respectively \$13,472,444; \$21,003,282.

Sheep: In 1914 there were 126,027 sheep in the Province, valued at \$892,271. There are a few pure-bred flocks. Leicester, Shropshire and Oxford are the breeds represented. Ranching is carried on as in Alberta, flocks varying from 2,000 to 4,000. The Government have set aside certain districts where leases for grazing alone can be got. The sheep on the ranches are mostly Merino grades. Shropshire, Oxford, Leicester and Lincoln rams are used. Also recommended, Suffolk, Southdown, Hampshires, Dorset Down, Dorset Horn, Cheviot, Cotswold and Kent.

Swine: In 1914 number 454,703. They are raised mostly for home consumption. Number in 1901, 27,000. Value (1914) \$4,396,978.

Poultry: \$2,500,000 worth of all kinds in the Province (1913).

Crops

Roots and Vegetables: Potatoes are the chief root crop, representing at least 70% of the total acreage. Turnips and mangels are grown for feed. Sugar beets have proved very successful in some parts of the province. Practically all the smaller garden vegetables are grown. In 1911, 30,160 acres of potatoes were planted. The average yield was 170 bushels per acre; the total production, 5,127,200 bushels.

Tree Planting: To meet the lack of natural protection against wind and snow, the Dominion Government, since 1901 has distributed trees for the planting in the Prairie provinces. These trees are raised at the Forestry Nursery Stations at Indian Head and Saskatoon, in Saskatchewan, and are distributed to applicants under defined conditions with regard to cultivation, the only charge being the cost of carriage. 45% are green ash; 30% Manitoba maple; 11% Dakota cottonwood; 9% American elm; 4½% willow, ¼% Russian poplar. Of trees set out, 85% are alive.

Fodder Crops: Alfalfa is being introduced, prizes being offered by the government. Hay (1913) was valued at \$8,250,000. Prairie grasses, timothy; rye and brome, alsike and corn are grown to some extent.

Crop Returns—1914

Fall wheat, 67,000 bus.....	\$ 66,000
Spring wheat, 73,427,000 bus.....	108,672,000
Oats, 61,616,000 bus.....	27,817,000
Barley, 4,901,000 bus.....	2,451,000
Rye, 54,000 bus.....	36,000
Mixed grains, 29,500 bus.....	15,000
Flax, 6,131,000 bus.....	6,192,000
Potatoes, 4,085,000 bus.....	2,289,000
Turnips, mangels, etc., 3,211,000 bus...	2,280,000
Hay and clover, 122,000 tons.....	834,000
Fodder corn, 7,000 tons.....	24,500
Alfalfa, 5,000 tons.....	75,000

Creameries 1914 Season: During the six months ending October 31, 1914, 1,161,000 pounds creamery butter were marketed, an increase of 313,000 lbs. over 1913. Represents the produce of 2,825 farmers.

Minerals: Clay, lignite coal, glass sand, gold

(in river beds), iron, ochres, peat, petroleum and salt.

Game and Fish: Lakes teem with whitefish, pike, perch, pickerel, tullipes, buffalo fish and suckers; rivers with gold eyes and sturgeon. Moose, elk, caribou, blacktail, whitetail and pronghorn buck are numerous in vast areas to the northwest. The lake shores form the breeding ground of wild fowl. Prairie chicken plentiful from spring to fall.

Furs: Value of annual shipment of furs is about \$500,000.

Lumbering: North of Prince Albert, which is the centre at present of the lumber industry, and east of that city, lumbering is extensively carried on. In the northern forest the timber is spruce, both white and black, larch or tamarack, jack pine, aspen or white poplar, balsam or black poplar, and white birch. Prince Albert has four lumber mills.

Province of Saskatchewan

Agricultural Instruction and Education

Saskatchewan College of Agriculture: College farm 1,040 acres, campus 293 acres, located at Saskatoon. College main building is used by College of Arts and Sciences and College of Agriculture, also students' residences in common. Provision is made for short courses, winter courses for young men, and four year course for B. S. A.

Better Farming Special: Sent over railway lines in newly settled portion of the Province. Train made up of:

A car of choice live stock: A young stallion of heavy draft breed; typical milking Shorthorn, Ayrshire and Holstein cows; specimens of the leading breeds of hogs suited to Saskatchewan; pen of cross-bred sheep, demonstrating how a pure-bred ram may raise the standard of a low-grade flock.

A car of mechanical exhibits: Small gasoline engine operating a cream separator, a churn and various household appliances. Demonstration on the use of cement on the farm given.

A car of models of farmsteads and farm buildings. The former illustrate methods of arranging the fields and buildings, the location of windbreaks, shelter belts and garden plots. The latter are models of practical farm buildings in which convenience of arrangement is combined with proper systems of lighting and ventilation.

An exhibit of special interest to poultry raisers, including a model of a portable cotton front poultry house; a trap nest; a fattening crate; also incubators, brooders and egg candling equipment. Specimens of various breeds of poultry.

Three lecture cars. In two of these, lectures on live farm problems were delivered by leading agricultural authorities. The third was devoted to lectures and demonstrations of special interest to farm women.

Agricultural College Extension Work

It is estimated that during the year 1913 the college reached directly upwards of 250,000 people through its Extension work. The summer fairs, seed grain and poultry fairs, good farming competitions, fields of standing grain competitions, spring stallion shows and plowing matches are all directed from the College and furnished with competent judges. Circuits for meetings are ar-

ranged for in the winter and competent speakers provided them. In June similar meetings are arranged for in the newer districts, where successful farmers from the older districts meet the new settlers and discuss with them the best methods of starting their farming operations as to breaking, seeding, and after tillage. Speakers are sent into the districts where foreigners have settled largely, with a view of assisting them.

In co-operation with the Department of Agriculture, lecturers and demonstrators have been sent out on the dairy trains and lectures and demonstrations given at the chicken fattening stations on the type of bird to fatten, methods of fattening, killing, plucking and packing.

The summer fairs, stallion shows, plowing matches and seed grain fairs are all used for demonstrating better types and methods.

Short Courses: Short courses are held during February and March at different points such as: Maple Creek, Carlyle, Milestone, Alsask, Oxbow, Macklin and Colonsay. Lectures and demonstrations are given on tillage, cereals, forage crops, use, care and management of farm implements and machines, beef and dairy cattle, hogs, sheep and swine and poultry. Home economic lectures and demonstrations are provided for the women and girls. At most places the school children attend the lectures during the day instead of their regular classes at school. At Maple Creek there was an attendance of 200; at Carlyle, 150. Members of the college staff and college graduates who are successful farmers in the Province comprise the staff for these short course schools.

An Alfalfa Competition: An Alfalfa Growing Competition was conducted by the Extension Department in co-operation with the Provincial Department of Agriculture. Prizes to the amount of about \$6,000 were distributed for fields of ten acres that were sown in 1912. By means of this competition it has been demonstrated that alfalfa can be successfully grown in all the settled parts of Saskatchewan.

Other Features: Spring stallion shows, plowing matches, field grain competition, seed fairs and poultry shows, agricultural and industrial exhibitions, homemakers' clubs, competitions for boys and girls.

Free Agricultural Bulletins

Apply to Department of Agriculture, Regina, Sask. They include among others: Pioneer Problems; Methods of Soil Cultivation; Better Farming; Hints for Flax Growers; Better Farming (for Beginners); Sheep in Saskatchewan (General); The Live Stock Industry; Hog Cholera; Blackleg Treatment; Care of Milk and Cream on the Farm; Feeding Chickens for Market; Special Live Stock Leaflets on Horse Breeding; Care and Management of Farm Horses, Beef Cattle, the Dairy Herd, Hogs; Live Stock Marketing Bulletin; Egg Circle Circular; Farm Bookkeeping Circulars, and various agricultural

reports and copies of acts relating to agricultural matters.

Education: A school district may be formed as soon as there are 8 children in a section. In 1913 there were in the province 15 high schools and collegiate institutes, 2,893 public schools; 15 Roman Catholic separate schools, 2 Protestant separate schools; 2,925 school districts; 1,979 high school students; 79,882 elementary school pupils; 308 first-class teachers; 1,242 second-class teachers; 945 third-class teachers. Provincial University at Saskatoon with departments in Arts and Sciences, Agriculture, Law, Engineering, Accounting.

How to Get a Farm in Saskatchewan

See Homestead Regulations for Manitoba, Saskatchewan and Alberta, page 55.

PROVINCE OF ALBERTA

DISTRICTS OF ALBERTA.

Population, 1911 Census.

Calgary	90,502
Edmonton	57,045
MacLeod	34,504
Medicine Hat	30,804
Red Deer	51,732
Strathcona	49,473
Victoria	41,161

CITIES, TOWNS AND VILLAGES OF ALBERTA.

With Population, 1911 Census.

A	
Acme	181
Airdrie	164
Alix	267
Athabasca Ldg.	177
B	
Banff	500
Banthead	1,000
Barnwell	200
Barons	75
Barrano	545
Bawlf	270
Bellevue	200
Blackfalds	150
Blairmore	166
Bowden	178
Bow Island	328
Brooks	456
Bruderheim	132
Burdette	200

C	
Calgary	43,665
Camrose	1,586
Canmore	450
Cardston	1,207
Carmanagay	288
Carstairs	270
Castor	1,659
Cayley	126
Champion	200
Chaton	55
Claresholm	809
Cochrane	393
Coleman	1,557
Cowley	142
Crossfield	307

D	
Daysland	349
Diamond City	506
Didsbury	726

E	
EDMONTON	24,555
Edson	250
Entwistle	140
Erskine	131
Exshaw	375

F	
Ferintosh	85
Ft. Saskatchewan	785
Frank	806

G	
Gadsby	213
Gleichen	583
Granum	250
Grassy Lake	300
Grouard	450

H	
Hardville	290
Hardisty	351
High River	1,173
Holden	111

I	
Innisfail	601
Innisfree	80
Irvine	372
Islay	80

K	
Killam	197
Kimball	250

L	
Lacombe	1,029
Lamont	192
Langdon	159
Lavoy	127
Leduc	526
Lethbridge	8,050
Lignite	300
Lille	303
Lloydminster	223

M	
MacLeod	1,537
Magrath	995
Mannville	169
Medicine Hat	5,573
Millet	162
Monarch	200
Morinville	385
Mountain View	89
Mundare	152
Munson	200

N	
Nanton	559
New Norway	61
North Edmonton	404
North Red Deer	304

O	
Okotoks	514
Olds	517

P	
Penhold	94
Pincher	116
Pincher Creek	1,057
Pincher Station	200
Ponoka	641
Provost	329

R	
Raymond	1,465
Redcliff	213
Red Deer	2,118
Ryley	110

S	
St. Albert	614
Sedgewick	331
Stafford	985
Staveland	245
Stettler	1,444
Stirling	514
Stony Plain	505
Strathcona	5,579
Strathmore	531
Strome	192

T	
Taber	3,321
Tofield	886

V	
Vegreville	1,029
Vermilion	625
Viking	153

W	
Wainwright	788
Walsh	200
Warner	321
West Edmonton	161
Wetaskiwin	2,611

PROVINCE OF ALBERTA.

Area, 163,382,400 Acres. Population, 374,663. Capital, Edmonton. Lieutenant Governor, Hon. G. H. V. Bulyea. Premier, Hon. A. L. Sifton.

Physical Features, Soil and Climate.

Alberta is a vast sloping plateau from 3,500 to 2,000 feet above sea-level, hung by its western on the foothills of the Rocky Mountains. It slopes gently towards the east and north. Absolutely level plains form no great proportion of the surface of the country. By far the larger proportion is undulating country diversified by forest, stream, hills and open country not unlike Ontario or New York State. Beautiful lakes fringed with forest and abounding in whitefish are scattered over its Central and Northern area. Everywhere luxuriant grasses and flowers cover the open country which formed the chief feeding grounds of the innumerable herds of bison of the past.

While open and treeless country characterizes the southern part of the Province, great stretches of prairie extend to the northern limits to the Hay River and the Mackenzie River. The prairie of the south passes into woodland to reappear again in higher latitudes. In other parts there is an agreeable alternation of woodland and

prairie, which prevails to 600 or 700 miles north of the Saskatchewan River.

Lakes and Rivers: The Province is the source of two of the four great river systems of the North American continent—the Saskatchewan and the Mackenzie. The Saskatchewan is divided into two great arteries, one of which, with its tributaries, the Bow, Belly, St. Mary's, Old Man, and Red Deer, waters the south, while the north branch, with the Brazeau, Clearwater, Sturgeon, Battle, Blindman, and Vermilion, as tributaries, waters the great central plains. The Peace and the Athabaska drain the north. Alberta's lakes are chiefly in the northern part, there being Lake Athabaska 120 miles long and Lesser Slave 60 miles long, and many bodies of water only a few acres in extent.

Soil and Products: Alberta has a wealth and diversity of natural products. A great proportion of the land is undulating prairie, well watered, and covered with a deep black loam, in many places 4 and 5 feet in thickness, the fertility

Province of Alberta

and depth of which give it a growing power practically inexhaustible. The province embraces about 162,765,200 acres. Of this 1,510,400 acres is the estimated area contained in rivers and lakes, leaving 161,254,800 acres of land. Allowing the odd sixty million acres for the rough land of the eastern slope of the Rocky Mountains, other mountains and hills, together with waste places that will not likely be suitable for cultivation, there still remains the enormous area of One Hundred Million acres available for settlement. Of this only about 4,000,000 acres were actually in crop during 1914. In other words, only about four per cent. of the land available for cultivation in the province has as yet been brought under the plow.

The Province naturally falls into three divisions, exhibiting marked distinctions in climatic and topographical conditions—Southern, Central and Northern Alberta.

Southern Alberta

Southern Alberta is open and rolling and devoid of timber, except along the streams and the Rocky Mountain foothills. The soil is a fertile loam. The climate is ideal, with pleasing summers and mild winters. Stock pasture in the open air during winter, grazing on the nutritive sun-dried grasses. The absence of timber in Southern Alberta is compensated for by the supply of coal.

For years this district was almost entirely a horse and cattle country, but now winter wheat is pushing the cowboy back, the range being rapidly converted into fields of grain and areas of sugar beets. With the introduction of "Alberta Red," a new era was ushered in for winter wheat. Sown on new breaking or summer-fallowed land from the middle of July to the end of September, winter wheat is ready for the reaper from the 1st to the 15th of August in the following year. Climate and soil combine to make Southern Alberta the ideal district for the growth of this cereal. Considerable spring wheat is also grown.

Water Supply and Irrigation: Water for domestic and farm purposes is easily obtainable at reasonable depth, and with an intelligent system of cultivation, aimed to make the best use of the rainfall, no fear need be entertained of shortage of moisture. In order to make sure that there would be no danger from this source, however, a number of irrigation ditches have been constructed.

In certain sections of the Canadian West as well as in the American West, there is a por-

tion of the country in which the soil is the very best for the growing cereals, but the geographical locations and relative position to the rain avenues do not give the advantage that other parts possess in the matter of precipitation. It is now ascertained that it is not altogether the number of inches of rain that is essential to the growing of crops, but its conservation, and that is the meaning of "dry farming." "Dry farming" may well be applied to districts where there is a heavy rainfall, and better results will follow. This system is being successfully followed in the southern portion of Southern Alberta.

Central Alberta

Central Alberta extends from the Red Deer River northward to the height of land between the Saskatchewan and the Athabaska. Hill and vale, clothed in grass and flowers, and dotted with spruce and aspen, mark this as the ideal land for the homes of a cultured people. Its great wealth is its dower of deep black humus, varying in depth from ten inches to three feet, which overlies a warm subsoil.

The Grains Grown: Winter wheat and spring wheat are raised successfully. Dominion census figures give the spring wheat acreage for 1913 for the Province as 1,256,300 as compared with 304,000 in 1909. By far the greater portion of this was in Central Alberta. The area of oats under crop, according to authority above quoted, in 1912 was 1,359,300 acres as compared with 820,000 in 1909; yields of up to 100 bushels to the acre are recorded, the average being placed at 48 bushels by the Dominion Government. Up to sixty bushels is the farmer's justified expectation, and Alberta already advocates a standard grade of oats calling for forty-two pounds to the bushel, as against the legal weight of thirty-two pounds in the Republic to the south.

Barley is a successful crop, about 35 bushels to the acre being the average of 1912. Acreage was 174,900. Flax and native hay are standard crops. (See 1914 table below.)

New Territory Opened: West and north of Edmonton, there is an immense stretch of splendid country, in which there are available a large number of homesteads. Wheat and oats are certain crops. Wonderful yields of the latter are reported. The rainfall is certain and sure. Mixed farming can be carried on most successfully. The wild grasses and the pea vine are there in such profusion that there is an ample supply of feed for stock, while water is convenient, plentiful, and easy to secure.

Crop Returns—1914.

	Value		
Fall wheat, 4,700,000 bus.....	\$ 4,426,000	Mixed grains, 72,000 bus.....	24,000
Spring wheat, 24,150,000 bus.....	21,977,000	Flax, 614,000 bus.....	645,000
Oats, 57,078,000 bus.....	23,972,000	Potatoes, 3,652,000 bus.....	2,374,000
Barley, 4,306,000 bus.....	2,451,000	Turnips, mangels, etc., 1,252,000 bus.....	751,000
Rye, 360,800 bus.....	238,000	Hay and clover, 304,000 tons.....	2,526,000
Peas, 8,100 bus.....	12,000	Fodder corn, 1,600 tons.....	5,600
		Sugar beets, 600 tons.....	2,000

Province of Alberta

Game: Game is plentiful and varied. Ducks, prairie chicken, swans, geese, cranes, waders, partridge, snipe, and plover afford excellent sport to the gunshot. Moose are obtainable in the north, with cariboo and red and black-tailed deer.

Wolves, foxes, bears, with the badger, muskrat, marten, mink, otter, ermine, and wolverine furnish a fur supply which runs well up into large money value each winter.

Agricultural Industries and Opportunities.

Poultry Raising: In a country where the winter price of fresh eggs ranges from 50 to 60 cents a dozen, and where the summer price rarely falls below 25 cents, extensive developments along this profitable line of mixed farming cannot be long delayed. Rocks, Wyandottes, Orpingtons and Rhode Island Reds are recommended.

Dairying: The dairy industry is destined to assume considerable proportions in Alberta. In the creameries operated by the Government for the farmers, over 2½ million pounds of butter were produced in 1911, which, sold at an average of 25 cents per pound, gives an estimated value of about \$600,000. Butter from private dairies gave \$250,000; cheese factories, \$28,000, a grand total of dairy products of \$880,000. Ideal conditions prevail for the dairy herd—abundance of feed, good water, and healthful climate. In sparsely settled districts the Government sends a traveling dairy for instruction.

Stock: Alberta is the Kentucky of Canada with regard to horse breeding. Its high altitude, dry and invigorating atmosphere, short and mild winters, its nutritious grasses and inexhaustible supply of clear, cold water, make it pre-eminently adapted for horse breeding; and the Alberta animal is noted for its endurance, lung power and freedom from hereditary and other diseases. Nearly all the breeds of horses known are represented on the farms and ranches. Clydesdales, Percherons, Shires, Suffolks, Thoroughbreds, Hackneys and Standard Breds are popular. Horses winter out at a nominal expense and without grain or even hay feeding. Alberta is now supplying the Province of British Columbia and the Yukon Territory with beef, as well as providing for a large export trade to the Old Country.

Four-year-old range steers which have never been under a roof nor fed a pound of grain, and less than a ton of hay, weigh about 1,500 pounds by the first of August, and if allowed to run till October go as high as 1,650 pounds.

Swine: Hog-raising is increasing. Favorite breeds here, Berkshire, Tamworth, Yorkshire.

Live Stock (1914)

	No.	Value
Horses	519,424	\$56,352,310
Milch cows	179,068	11,886,534
Other cattle	633,032	28,980,205
Sheep	211,001	1,468,567
Swine	397,123	4,062,563

Telephones: The Province owns and operates its own telephones. Long distance mileage, 3,500 miles; rural lines, 2,500 miles; number of subscribers, 1,030. It has 1,700 telephones and a capital outlay of \$3,800,000.

Mineral Resources: Alberta has enormous coal and lignite areas, the production of coal in 1911 being over 3 million tons, valued at over 7½ million dollars. The settlement of the country, together with the great railway construction, will mean a rapid increase in coal consumption. Its coal supply is practically inexhaustible, and underlies much of the whole Province in seams from four to twelve feet thick, to be found in outcroppings on the banks of every stream and in shafts from 20 to 150 feet deep. All grades are found, lignite, bituminous, and anthracite. The total formation contains not less than 12,800 square miles and has an estimated content of 71,000,000,000 tons.

Natural gas, under heavy pressure, has been found at Medicine Hat, Dunmore Junction, and Bow Island on the South Saskatchewan, and at Pelican Rapids on the Athabaska. Important commercial oil fields have been located near Calgary.

Fish: The Great Lakes of the North furnish yearly half a million pounds of incomparable whitefish, while the fur wealth of the North is an important asset.

Agricultural Instruction and Education.

Schools of Agriculture: There are three, established on the demonstration farms at Vermilion, Olds and Claresholm. They specialise in Field Husbandry, Animal Husbandry, Farm Mechanics and Household Science, providing a two-year course. Attendance 166 boys and 162 girls. Extension work is carried on in neighboring districts, such as dairy competitions, crop experiments, testing of seeds, etc.

School Gardens: Summer sessions are given at Normal School at which graduates are given a course in Agriculture and school gardening. School boards and teachers are encouraged by

special grants for garden maintenance and equipment. School garden exhibits are made at some local fairs.

Instruction Trains: These have been used successfully in dealing with Good Seeds, Grain Judging, Mixed Farming, and Live Stock demonstrations.

Short Courses: Held for a week at each of 9 points in the Province (1914); live stock, seed judging, poultry raising, dairying, veterinary science are dealt with.

Regular Institute Meetings are held throughout the province for the discussion of all topics relating

Province of Alberta

to farm work—the cultivation of soil, the eradication of weeds, conservation of moisture, the growing of feed for live stock and the feeding, breeding, care and handling of live stock.

Women's Institute: These are in charge of a special superintendent.

Other Features: Agricultural societies, demonstration farms, egg-laying competitions, live stock sales and shows.

Demonstration Farms: There are seven at various points in the Province: Claresholm, Olds, Vermilion, Medicine Hat, Sedgewick, Stony Plain, Athabasca Landing.

Free Agricultural Bulletin

Apply to Department of Agriculture, Edmonton, Alberta. Among these are: Care of Milk on the Farm, Co-operative Marketing of Eggs, Weeds of Alberta, Studies in Our Common Grains, Practical Poultry Keeping, Wintering Brood Sows, Why Sows eat Their Pigs, Housing of Swine, Preparing for the Pig Crop, the Suckling Period, Meat Curing on the Farm.

Potato Varieties: Experiments at Vermilion (1914) gave the following results:

Variety	Yield per Acre
Wee Macgregor	302 bushels
Gold Coin	234 bushels
Burbank	193 bushels
Table Talk	179 bushels
Mayfield Blossom	174 bushels
Sutton's Satisfaction.....	149 bushels

Education: Any portion of the Province of Alberta may be created into a public school district, provided that (1) It does not exceed 4 miles in length or breadth, exclusive of road allowances. (2) It contains 4 persons liable to assessment, and 8 children between ages 5 and 16. 528 schools were established in 1911 and 1912. The number of pupils enrolled up to the end of 1913 was 79,909. There are now two Provincial Normal Schools, at Calgary and Camrose respectively. The University contains over 500 students, has departments in Arts and Sciences, Engineering, Architecture, Applied Science, Medicine, Law, Alberta College (Theology, Methodist) and Robertson College (Theology, Presbyterian) are affiliated with the University.

How to Get a Farm in Alberta.

See Homestead Regulations for Manitoba, Saskatchewan and Alberta, page 55.

SPECIAL HOMESTEAD REGULATIONS

In Alberta, Saskatchewan and Manitoba

All public lands in the provinces of Manitoba, Saskatchewan and Alberta are controlled and administered by the Dominion government through the Department of the Interior. These are the lands that are disposed of as free homesteads, and are surveyed into square blocks, six miles long by six miles wide. Such blocks are called townships.

Each township is subdivided into 36 square blocks, called sections. A section is a mile square and contains 640 acres. The sections are numbered from one to thirty-six.

Each section is divided into four square blocks, called quarter-sections.

A quarter-section is half a mile square and contains 160 acres. It is the unit on which these lands are dealt with.

As a section is a square whose sides run east and west and north and south, the four quarters which it contains are described, according to their location, as the northeast quarter, the northwest quarter, the southeast quarter, the southwest quarter.

Any quarter-section vacant and available of Dominion land in Manitoba, Saskatchewan or Alberta, excepting 8 and 26, may be homesteaded by any person the sole head of a family, or any male over eighteen years of age, who is a British subject, or declares intention to become a British subject, on payment of an entry fee of \$10.

A widow having minor children of her own dependent on her for support is permitted to make homestead entry as the sole head of a family.

Entry must be made in person, either at the land office for the district or at the office of a sub-agent authorized to transact business in the district, except in the case of a person who may make entry for a father, mother, son, daughter, brother or sister, when duly authorized by the prescribed form, which may be had from your nearest government agent.

The homesteader may perform residence duties by living in habitable house on homestead for six months in each of three years.

A homesteader may perform the required six months' residence duties by living on farming land owned solely by him, not less than eighty (80) acres in extent, in the vicinity of his homestead. Joint ownership in land will not meet this requirement.

If the father (or mother, if the father is deceased), or son, daughter, brother or sister, of a homesteader, has permanent residence on farming land owned solely by them, not less than eighty (80) acres in extent, in the vicinity of the homestead, or upon a homestead entered for by them in the vicinity, such homesteader may perform his own residence duties by living with the father (or mother). The term "vicinity" in the two preceding paragraphs is defined as meaning not more than nine miles in direct line, exclusive of the width of road allowance crossed in the measurement.

A homesteader performing residence duties

while living with parents or on farming land owned by himself must so notify agent for district and keep him informed as to his postoffice address. Otherwise his entry is liable to be canceled.

Six months' time is allowed after entry before beginning residence.

A homesteader residing on homestead is required to break 30 acres of the homestead (of which 20 must be cropped) before applying for patent. A reasonable proportion of cultivation duties must be done during each year.

When the duties are performed under regulations permitting residence in vicinity, 50 acres must be broken (of which 30 must be cropped).

Application for patent may, on completion of duties, be made by homesteader before an agent or homestead inspector, or before a sub-agent for district.

Pre-emption: In a district of Southern Saskatchewan and Alberta an additional quarter-section may be pre-empted by a person who has secured a homestead but has not previously obtained a pre-emption under any Dominion lands act. The pre-empted land must adjoin the homestead or be separated therefrom by only a road allowance. Entry fee, \$10.

Duties: (1) Residence of six months in each of six years on either homestead or pre-emption. (2) Erection of habitable house on either homestead or pre-emption. (3) Cultivation of 30 acres of homestead or pre-emption or both. Payment for pre-emption, \$3 per acre, as follows: One-third purchase money at end of three years from date of entry; balance in five equal annual installments, with interest at 5 per cent.

Newly arrived immigrants will receive at the immigration office in Winnipeg, or at any Dominion land office or Department of Interior, Ottawa, Canada, information as to lands open for entry, and from the officers in charge, free of expense, advice and assistance in securing lands to suit.

Dominion Grazing Leases (in Alberta and Saskatchewan): Leases will be granted for 10 years. The maximum area granted to any one person is 12,000 acres. Application for grazing leases on any land will only be granted after inspection to determine whether the land is grazing or agricultural land. Should the inspector of ranches, on making examination of a tract of land applied for, find that there are conflicting interests in the land affected, and that the granting of a lease would be an injustice to other settlers who had been using the land, the same, if unfit for agricultural purposes, may be withdrawn from entry and reserved for public grazing purposes. Lessees must fence the area they obtain under lease, and must have 1 head of horses or cattle, or 5 sheep for every 30 acres. Where the inspectors consider the land will carry more stock, they will fix the number to be grazed on each area. One-third of the required stock must be placed the first year on each area granted. At least 25 per cent of the stock must always be breeding stock.

Special Homestead Regulations

Dominion School Lands

These comprise Sections 11 and 29 in every township in Manitoba, Saskatchewan and Alberta. They are administered by the Dominion government in trust for the province and can only be disposed of by sale at public auction to the highest bidder, subject to a certain upset price. The revenue from school lands is invested in Dominion securities and the interest thereon paid annually to the provinces for educational purposes.

Sales: Sales are held yearly, provided the conditions are favorable, the lands being first inspected and valued to determine the upset price. **Terms:** One-tenth cash and balance in nine equal annual instalments, with interest at 5 per cent. Scrip or warrants are not accepted in payment. There are no settlement conditions.

Leases: Leases of these lands are issued for the following purposes: For coal mining for a term of 21 years, at a rental of \$1 per acre and subject to a royalty of five cents per ton; for petroleum and natural gas for 21 years, subject to a payment of rental for the first year of 25 cents per acre and at the rate of 50 cents per acre for the subsequent years, for fire clay for a term of 21 years, subject to a rental at a rate of \$1 per acre, not more than forty acres being leased to any one person, for hay purposes for a term of five years, subject to the payment of rental at the rate of 25 cents per acre.

Permits: Permits are issued for the purpose of grazing stock on School Lands, covering one year ending the 1st of April, but renewable from year to year at the option of the Department.

The Settlers' Twelve Commandments

Wheat Raising in a Nutshell

By Permission of the Saskatoon Board of Trade

- (1) Break the land one to two inches deep; but as shallow as possible. Turn the sod right over so that the grassy side is lying flat down.
- (2) Breaking should be done before the end of June, and if possible by the middle of that month. This is highly important, as late breaking will not produce profitable crops.
- (3) All such early breaking should be back-set during the later summer after the sod has rotted. In back-setting, the sod is simply put back into its original position, the grassy side up, and about one to two inches of earth brought up with the plow to cover it. Disc and harrow immediately after back-setting.
- (4) Frequently, the newcomer does not arrive till late in June. In the case of breaking done late in June, plow DEEP,—say, four inches,—and DO NOT BACK-SET; but merely disc thoroughly, and then harrow. The more cultivation the better.
- (5) It is sometimes impossible to back-set extra-heavy land. In this case, the land should be treated as per FOURTH Commandment, whether it be early or late breaking.
- (6) In spring, harrow and sow as soon as the frost is out of the ground sufficiently to allow the seeder to go down the proper depth. Follow the seeder with a land packer, and the packer with a harrow. The use of the land packer will add at least five bushels per acre to the crop.
- (7) **DEPTH TO SOW:** Scrape back the surface of the ground with the hand so as to ascer-

tain the depth of the moisture from the surface. Adjust the seeder so that it will sow in the top of the moisture,—not above it, nor deep into it; but just in the top of it.

(8) **SOW THE BEST, THOROUGHLY-CLEANED SEED OBTAINABLE, and nothing else. Pay for the BEST,—and get it.**

(9) After harvesting the first crop, the land should either be plowed, disced and packed in the fall, or, where the soil is clean, the stubble may be burned off in the spring, the land disced without plowing, and a second crop sown, as per SIXTH Commandment.

(10) Summer fallowing should start after the SECOND crop is taken off. Plow the summer fallow as soon as possible after seeding the other land you are cropping. NEVER leave this plowing till after June. Experience has proven that one early plowing is better than two. Weeds absorb much moisture. Keep down weeds by cultivation, and so conserve the moisture in your summer fallow. In the spring following, put in your crop as per SIXTH Commandment.

(11) After cutting first crop from summer fallow, allow the land to lie till the following spring,—then, simply burn off the stubble, disc up the surface, and put in second crop as per SIXTH Commandment. This second crop, if so put in, should be almost as good as the first. Summer fallow land EVERY THIRD YEAR.

(12) Sow a bushel-and-a-half on new breaking and on summer fallow; and a bushel-and-a-quarter on stubble. Before sowing, all seed should be treated for smut.

PROVINCE OF BRITISH COLUMBIA

DISTRICTS OF BRITISH COLUMBIA

POPULATION, 1911

Comox-Atlin	42,263
Kootenay	50,772
Nanaimo	31,822
New Westminster	55,479
Vancouver	123,902
Victoria	51,860
Yale & Cariboo	56,582

CITIES, TOWNS AND VILLAGES IN BRITISH COLUMBIA.

POPULATION OR OVER, 1911 Census.

Abbotsford	200
Agassiz	200
Ahousat	275
Ainsworth	200
Alberni	200
Alert Bay	210
Anaconda	200
Armstrong	210
Arrowhead	200
Ashcroft	200
Atlin	200

Barkerville	200
Barnet	200

Beaconsfield	200
Beaver Lake	200
Bellabell	200
Bialne	200
Brechin	200

Camboorne	250
Canoe Pass	200
Central Park	30
Chemainus	200
Chilliwack	1,657
Clayoquot Sound	630
Clo-nose	200
Cloverdale	200
Cobble Hill	250
Comox	200
Comox	200
Corbin	400
Cranbrook	2,388
Creston	250
Cumberland	1,337

Duncans	200
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Eholt	200
Enderby	525
Erie	200
Esquimalt	4,001
Extension Mines	250

Fairview	200
Ferguson	200
Fernie	1,287
Fort Steel	276

Golden	832
Grand Forks	1,917
Greenwood	1,704

Hedley	200
Hosmer	2,019
Jedway	200

Kamloops	3,773
Kaslo	1,000
Kelowna	1,063
Kincolith	200
Kingcome Inlet	200
Kit-A-Mant	210
Kitchener	200
Kyuquot	400

Ladner	200
Lady Smith	2,295
Langley	200
Langley Prairie	200
Lulu Island	200
Lytton	200

Marysville	200
Merritt	1,300
Michel	1,515
Midway	200
Mission City	200
Mosquito Harbor	200
Moyle	200

Nakusp	247
Nanaimo	2,305
Nelson	4,543
New Denver	250
New Michel	662
New Westminster	13,394
Northfield	200
North Vancouver	7,781

Peachland	200
Penticton	200
Phoenix	200
Point Grey	200
Port Essington	200
Port Hammond	200
Port Haney	200
Prince Rupert	4,154
Princeton	200

Quatsino	200
Quatsino Sound	200
Revelstoke	3,010
Rossland	2,877

Salmon Arm	400
Sandon	200
Sechart	200
Slocan	200
South Vancouver	16,021
Steveston	1,100
Stewart	200
Summerland	200

Telegraph Creek	270
Trail	1,400
Trout Lake City	250

Vancouver	100,333
Vernon	2,371
VICTORIA	31,670

Wardner	250
Wellington	250
Ymir	650

PROVINCE OF BRITISH COLUMBIA

Area, 227,747,200 Acres. Population, 392,480. Capital, Victoria. Lieutenant Governor, Hon. Frank Barnard. Premier, Hon. Sir Richard McBride

Historical Note

Among the Indians of the coast of British Columbia there is a legend of the coming of the Santiago, a Spanish vessel captained by Juan Perez, in 1774. The vessel was seen far at sea from the Indian village known as Oum-Mis. On first sighting her, the Indians thought it was an enormous bird, but when she came nearer and they could see people on board it seemed to be "some wonderful and very large canoe come back from the land of the dead with their bygone chiefs."

Captain Cook, the famous navigator, anchored off Nootka Sound early in 1778 and his discovery led to the establishment of a trading post here. Many British traders soon ventured into these waters. In 1783 Captain John Meares built a trading post and fort here. The Spaniards, who at this time claimed control of the whole Pacific Coast, seized Captain Meares' post in 1789, but it was soon restored.

Captain George Vancouver, after whom Vancouver Island is named, had been a sailor under Captain Cook and to him was entrusted the duty of receiving back this territory from the Spaniards and of making further explorations.

In 1770 an agent of the Hudson Bay Company

visited the mainland of British Columbia, which was for some time known as New Caledonia. The company founded trading posts on the mainland in 1806 and on Vancouver Island in 1843. a colony was formed on the island under the auspices of the company in 1849 and in 1856 representative government was granted to the settlers.

The discovery of gold on the mainland brought a large influx in 1856-57 and a government was organized in British Columbia with Sir James Douglas as Governor. In 1866 Vancouver Island and British Columbia were united into one province, which in 1871 joined the great Dominion.

Location and Extent

The Pacific Maritime Province of Canada, as British Columbia is often called, is a great quadrangle of territory, 700 miles long, and averaging 400 in width, lying between the Rocky Mountains and the Pacific Ocean. Extending north from the forty-ninth parallel of latitude, it has a coast line of 450 miles on the Pacific Ocean, the northern portion being cut off from the sea by a narrow strip of Alaskan Territory. The boundary on the north is the sixtieth parallel.

Province of British Columbia

Natural Divisions

The province may be divided roughly into three areas, each having its special characteristics, viz.:

1. **Islands:** The islands adjacent to the coast, comprising Vancouver Island, the Queen Charlotte group and the innumerable islands of various sizes that dot the coast line. Washed by the waters of the Japanese current, the climate is mild and moist, and the same may be said of the narrow strip of territory intervening between the Coast Range and the seashore. This influence also affects to some extent the estuaries of the rivers flowing into the Pacific.

2. **Interior Plateau:** The great interior plateau, flanked by mountains on the east and west, and forming the southern half of the mainland. This is elevated some 3,500 feet above sea level,

and has been so deeply eroded by lake and river streams that in some parts it appears mountainous, but the absence of sharp edges to the hill tops and the innumerable rounded boulders point conclusively to the fact that at some remote period this immense area was the bed of a vast inland sea.

3. **The North Country:** The northern half of the province is separated from the plateau by various cross mountain chains, from whence spring the head waters of the Peace River. Except in isolated patches, comparatively little is known of this area. The Coast Range of mountains forms a rocky frontier on the west, while the eastern boundary, following the one hundred and twentieth meridian of longitude, cuts the Rocky Mountains at the Peace River Pass, and continues north through a rolling prairie region that has never been thoroughly explored.

Agricultural Possibilities

Local Markets: The requirements of the Province in the way of agricultural products are shown by the importations for an average year. Butter, \$2,560,000; condensed milk and cream, \$676,000; eggs, \$1,616,879; poultry, \$474,718; cheese, \$445,000; fresh meats, salt pork, ham, bacon and lard, a total of \$4,118,000; beef cattle, sheep and swine, \$2,500,000; fruits and fruit products, \$930,000.

Agricultural Land: Professor Macoun, after personal investigation, says: "The whole of British Columbia south of 52 degrees and east of the Coast Range, is a grazing country up to 3,500 feet, and a farming country where irrigation is possible. Roughly estimated, these fertile lands may be set down at 3 million acres. North of 52 degrees there are over 10 million acres of agricultural land."

Climate: The Japanese Current and the moisture-laden winds from the Pacific Ocean exercise a moderating influence on the coast and for at least 100 miles inland. These moist winds are in great part arrested by the Coast Range, but the higher currents carry some of the moisture on to the loftier peaks of the Selkirk, causing a heavy snowfall, by which it is exhausted. Thus a series of wet and dry belts is formed. In the dry belts irrigation is used; the air is dry and pure. The climate of Vancouver Island and the coast generally corresponds closely with that of the south of England. Thunderstorms, heavy snowfalls and severe frosts seldom occur.

Rainfall varies widely, being from 11 inches to 137 inches in a year, according to localities.

Horses: Are in demand in cities and lumbering districts. Clydesdales are bred extensively. Harness and saddle horses sell well.

Cattle and Dairying

In the districts surrounding the larger cities of the coast, in the Fraser Valley, and on Vancouver Island, the dairy industry has been making rapid strides. In those districts in the immediate vicinity of Victoria and Vancouver, Holsteins predominate, while on the islands and in other districts where creameries have been established, Jerseys and Ayrshires are more largely kept. With the establishment of the creamery system, the quality of the butter has been greatly improved, and the quantity placed on the market increased as well.

Extra choice Holstein, Jersey, Guernsey and Ayrshire bulls, for breeding purposes, command exceptionally good prices. Many of these have been brought in recently and long prices have been paid for them. Prices for heavy-producing pure-bred cows are also good, ranging from \$200 to \$500. Grade cows sell from \$40 to \$150, according to the quality. The principal grades being bred are Jersey and Holstein.

Hereford and Shorthorns are raised on ranges for beef. The product of the creameries and dairies is about \$2,600,000 yearly.

Milk cows in Province (1914), 35,702, value \$3,168,553; other cattle, 99,091, value \$5,895,915.

Swine: As a complement to the dairy industry, the raising of swine proves very profitable. With comparatively mild winters, where there is very little snowfall, and where abundance of green food may be produced, hogs may be raised cheaply. In many parts of the Province clover and alfalfa do very well, and in the Fraser Valley, along the lower mainland and on Vancouver Island—the chief centre of the dairy industry—hogs are being kept in great numbers. The chief breeds are Yorkshire, Tamworth and Berkshire, with crosses of Yorkshire-Berkshire and Tamworth-Berkshire. Number in province (1914), 39,031, value \$466,030.

Sheep: British Columbia is annually importing thousands of mutton carcasses from Australia, as well as from other parts, and at present comparatively little is produced at home. In many parts of the province there are few other industries which could be made more profitable than the growing of sheep. The production of mutton is a more important factor than the pro-

Province of British Columbia

duction of wool, consequently the short and medium wool breeds predominate. Also the climatic and soil conditions have something to do with the breeds kept. Shropshires, Southdowns and Oxforda are most numerous, while a few Lincolns, Leicesters and other breeds are in favor in some parts. Number in province (1914), 45,000, value \$374,850.

Goats: A comparatively new industry is being developed in many parts of the province. In such districts as the East and West Kootenays, where, because of the nature and contour of the land and the fact that most of it is not cleared, dairying cannot be developed, the milch goat is being bred.

Poultry Raising: May be carried on in all parts of the Province. There are some ranches exclusively given to poultry, but it is a good industry in connection with orcharding or mixed farming.

In some parts of the Province, especially on Vancouver Island, the greater majority of fowls kept are of the lighter or egg-laying breeds, such as Leghorns, Minorcas, etc.

Turkeys can be raised very cheaply and successfully in the sparsely settled districts, where plenty of free range can be secured.

Grain Growing: Wheat is grown principally in the Fraser Valley, Okanagan, Spallumcheen, and in the country around Kamloops in the Thompson River Valley. Until the northern interior of the Province is brought under cultivation through the construction of railways, the wheat area will not be greatly increased. Wheat is only grown on the mainland coast and Vancouver Island for fodder and poultry feeding.

Barley of excellent quality is grown in many parts of the Province.

Oats are the principal grain crop, the quality and yield being good, and the demand beyond the quantity grown. Rye is grown to a limited extent, and is used for fodder.

The average yield of grain and prices are as follows:

	Bushels per Acre	Price per Ton
Wheat	25.62	\$28.00
Oats	45.00	35.00
Barley	33.33	35.00

These averages are very much exceeded in many cases, according to nature of soil and local conditions. In the matter of oats, as high as 100 bushels to the acre is not an uncommon yield.

Root Crops: Potatoes, turnips, beets, mangels and all other roots grow in profusion wherever their cultivation has been attempted. Sixty-eight tons of roots to a measured acre is recorded at Chilliwack, and near Kelowna, on Okanagan Lake, 20 acres produced 403 tons of potatoes, which sold at \$20 per ton. The Dominion census places the average yield of potatoes at 162.78 bushels to the acre. The average price of potatoes is \$20 per ton, while carrots, turnips, parsnips, and beets sell at an average of about 60 cents per bushel.

Hop Culture: The Okanagan, Agassiz, and Chilliwack districts are well suited to hop growing, and produce large quantities, unexcelled in quality. British Columbia hops command good prices in the British market, and most of the crop is sent there, though now eastern Canada and Australia are buying increasing quantities. The yield of hops averages 1,500 pounds to the acre, and the average price is 25 cents per pound.

Fodder Crops: Besides the nutritious bunch grass which affords good grazing to cattle, horses and sheep on the benches and hillsides, all the cultivated grasses grow in profusion wherever sown. Red clover, alfalfa, sainfoin, alsike, timothy and brome grass yield large returns—three crops in the season in some districts and under favorable circumstances. Hay averages about one and one-half tons to the acre, and the price from \$17 to \$25.

Crop Returns—1914

	Bushels	Value
Fall wheat.....	175,000	\$ 214,000
Spring wheat	194,000	239,000
Oats	3,171,000	1,300,000
Barley	97,000	89,000
Peas	41,000	59,000
Mixed grains	136,000	140,000
Potatoes	2,675,000	2,087,000
Turnips, mangels, etc.....	1,511,000	806,000
	Tons	
Hay and clover.....	352,000	5,470,000
Fodder corn	3,000	18,000
Alfalfa	28,000	\$81,000

Fruit Growing: It is estimated one million acres south of the fifty-second degree will produce all fruits of the temperature zone. The principal production is of apples, followed by plums and prunes, strawberries, crabapples, peaches, cherries, pears, raspberries and apricots. In 1891 the Dominion census showed a

total acreage of fruit of 6,437; in 1901, 7,430, and in 1910, 33,606. A provincial orchard survey of 1913 showed 38,196 acres, and in addition 1,600 acres in small fruits; a total of, roughly, 40,000 acres. In 1902 the freight shipments were 1,956 tons; in 1913 C. P. R. freight shipments of fruit alone were 13,800 tons. Shipments of fruits and vegetables by express in 1911 were 2,785,000 pounds; in 1912, 4,330,000 pounds; in 1913, 5,204,000 pounds. The total commercial production of fruits in 1913 was valued at \$1,310,570; 31,127 boxes of apples were exported to Australia and New Zealand in 1913; large shipments were made to Great Britain, China and Ceylon, in addition to Canadian trade.

The recognized fruit districts include the southern part of Vancouver Island and the Gulf Islands, Lower Fraser Valley, Thompson Valley, Shuswap Lake, Okanagan, Osoyoos, Similkameen, Upper Columbia Valley, Kootenay Lake, Arrow Lake, Lower Columbia, Grand Forks, Nicola, Grand Prairie.

Province of British Columbia

Some Fruit Records

In Okanagan there are instances of \$500 to \$600 gross profit per acre. At Kelowna 9 tons of pears and 10 tons of prunes per acre are not uncommon. Near Nelson, 14 acres produced 1,000 cases of strawberries and 94 tons of roots, netting the owner \$100 per acre. This land was formerly a cedar swamp. At Lytton, Tokay grapes, averaging four pounds to the bunch, were grown in the open. On the Coldstream Ranch, near Vernon, 20 acres produced \$10,000 worth of Northern Spy apples. Tomatoes to the value of \$1,500 per acre were grown on Okanagan Lake. A cherry tree at Penticton produced 800 pounds of fruit; another, at Agassiz, 1,000 pounds.

In the suburbs of Victoria the following results are authenticated: Four acres of strawberries produced 28,126 pounds of fruit, which sold for \$2,598 net, or \$650 per acre; half an acre produced 2,826 pounds, giving a net return of \$301; another grower raised 12,556 pounds of berries on one and one-half acres, which sold for \$1,228.60 net, or over \$800 per acre. Rockside Orchard, Victoria, produced marketable plums and cherries from ten-year-old trees as follows: Plums—35 trees Grand Duke, 443 crates, averaging 22 pounds; 18 Hungarian prunes, 216 crates; 27 Engelbert, 290 crates; 10 Tragedy, 142

crates—1,070 crates, a total of 20,416 pounds from 90 trees. Cherries—Twenty-five Olivet trees yielded 230 crates of 24 pounds, or a total of 5,520 pounds. Such returns are, however, exceptional, and no criterion of average production or returns, which vary much with conditions.

Varied Products: Tobacco is grown successfully in several districts. Flowering bulbs, celery, onions, rhubarb, cranberries, tomatoes and sugar beets do well.

Beekeeping is carried on especially in the interior fruit-growing districts.

Irrigation is carried on actively. The government is formulating a plan for the reclamation of hundreds of thousands of acres.

Mineral Production: Includes building stone, marble, cement and clay products, coal, copper, lead, gold, gypsum, petroleum, platinum, salt, silver, zinc. Total yearly output (1913), \$28,086,312.

Fisheries: Include salmon, halibut, herring, sturgeon, sea bass, colachans, mussels, flatfish, black cod, perch, trout, skiff, sardines, anchovies, shad, oysters, clams, crabs, shrimps, prawns. Year's production (1913), \$14,455,188.

Manufactures: Value according to last census, \$55,304,235 annually.

Agricultural Instructions and Education

Horticulture: Province has six horticulturists, who advise growers as to soil locations, varieties, methods, packing, grading, etc. Lectures, demonstrations, 18 demonstration orchards, etc.

Insect Pests: Investigation and experimental work; laboratory at Vernon, in Okanagan Valley. Nursery and orchard inspection carried on.

Poultry instructors, veterinary inspectors, field and crop instructors, agriculturist, conduct educative and supervisory work in these respective branches.

Farmers' Institutes: Ninety-five; membership, over 8,000.

Women's Institutes: Thirty-five; membership, about 3,000.

Sixty-one agricultural associations. Hold fall fairs.

Provincial Associations: Fruit Growers, Dairy-men, Stock Breeders, Poultrymen and Flockmasters.

Board of Horticulture: An advisory board of seven members from different agricultural districts to advise the minister on horticultural matters.

Elementary Education

The plans of the Education Department with reference to agricultural education include the following: The special training of teachers in rural science; special grants to teachers and school boards where rural science is taught; grants to school boards in aid of general school-ground improvement; establishing of a provincial school nursery; agricultural instruction in high

schools, with district supervision of related public-school work. The work is in charge of the Director of Elementary Agricultural Education, Department of Education, Victoria, B. C.

Free Agricultural Bulletins: May be obtained on the following subjects—Feeding Farm Animals (Dairy Cows), Orchard Cleansing, Practical Poultry Raising, Guide to Beekeeping, Control of Tuberculosis, Fruit-growing Possibilities, Skeena River, Place and Purpose of Family Life, Preparation of Food, Preparation of Silos, Natural and Artificial Incubation and Brooding, Alfalfa, Labor-saving Devices, Apiculture in British Columbia, Irrigation in British Columbia, Food and Diet (Part I), Exhibiting Fruit and Vegetables, Market Poultry, The Art of Right Living, Information for Fruit Growers, Care of Young Children, Care and Marketing of Eggs, Boys and Girls' Field-crop Competitions, Hints on Caring for School Gardens, Field-crop Competitions 1913-14, How to Grow Tobacco from Seed, Tuberculosis in Poultry, Construction of Fresh-air Brooders, Management of Turkeys, Clover Dodder.

Apply to the Department of Agriculture, Victoria, B. C.

Education: Complete system of free education established 1873; 2,000,000 acres of land have been set aside as an endowment for a provincial university, site of which is at Vancouver. Enrollment in schools (1913), colleges 224, high schools 30,378, rural municipal schools 13,573, rural assisted schools 12,573, graded city schools 30,378.

Province of British Columbia

Government Lands in British Columbia

Dominion Lands: All land within 20 miles on each side of C. P. R. main line belongs to the Dominion, and is administered by the Department of the Interior, practically according to same regulations as the public lands in Manitoba, Saskatchewan and Alberta. The Dominion also owns 3,500,000 acres in British Columbia on the Peace River, subject to the same regulations.

Provincial Lands for Sale: Unreserved crown lands may be purchased: First class, \$10 per acre; second class, \$5 per acre; payable 50 cents per acre on application, balance when land is finally allotted. A second purchase will not be granted unless the land included in first purchase has been improved to the extent of \$3 per acre. **Leases:** Leases of crown lands surveyed in lots of 20 acres may be obtained subject to improvements. Leases of 640 acres may be granted—for cutting hay, 10 years, for other purposes, 21 years. Agent may stake leased lands.

Preemption: Agricultural land (not exceeding 160 acres) may be pre-empted. No person can hold more than one claim at a time. Claims cannot be staked by agent. Settler must occupy within 60 days from allowance of claim, have land surveyed within five years from date of record, make improvements, \$5 per acre, including the clearing and bringing under cultivation five acres, and occupy continuously for three years. More than two months' continuous absence during any one year without leave is deemed cessation of occupation. No crown grant can be issued to aliens not naturalized. The pre-emptor shall, after complying with the act in respect to occupation and improvement, be entitled to a free grant of land upon payment of a crown grant fee of \$10. Write Deputy Minister of Lands, Victoria, B. C.

DOMINION OF CANADA SPRAYING CALENDAR

How to Protect Fruits, Vegetables and Ornamental Plants from Insects and Fungous Diseases

By W. T. Macoun, Dominion Horticulturist

Much injury is done to fruit and vegetable crops every year by the ravages of insects and fungous diseases, and ornamental plants also suffer greatly. A large part of this injury could be prevented if everyone who grew these crops would use the methods of controlling them which are given here. In some cases the results are not so apparent as in the killing of potato beetles, and fruit growers are sometimes discouraged and decide to stop spraying and take their chances. This often happens after there has been a year when there has been little or no Apple Scab, when the man who does not spray has about as

clean fruit as he who has done so. But the experience of the most successful fruit growers is that it does not pay to take chances, and that the best results follow, taking one year with another, when spraying is done every year. The pests of the garden can nearly all be controlled by poisons or sprays of some kind, but to be effective they must be given at the proper time and the work must be done thoroughly. Several formulae are recommended here for the same purpose. This is done because in the country, or in small towns, it is often much easier to get some materials than others.

PLANT.	1st Application.	2nd Application.	3rd Application.
APPLE. Scab or black spot fungus, sooty blotch, black rot, codling moth, leaf-eating caterpillars, borers, blister mite, curculio, apple aphid, scale insects.	Lime-sulphur wash or Poisoned Bordeaux. Just as leaf buds are opening. (Important.)	Poisoned Bordeaux or Lime-sulphur wash. Just before blossoms open. (Important.)	Poisoned Bordeaux or Lime-sulphur wash. As soon as blossoms fall. (Important.) From one to three more sprayings may be necessary to control the apple scab, depending on the season and prevalence of the disease. Alkaline wash. For borers at end of May.
	Nicotine sulphate, Kerosene emulsion or Whale-oil soap just when buds break and eggs are hatched for aphid; again in late May or June when young scale insects hatch. Nicotine sulphate, if used mixed with the Lime Sulphur wash, will kill many of the aphid. For oyster-shell scale, spray trees late in autumn with Lime wash, two coats, applying the second as soon as first is dry. Lime Sulphur wash for San Jose Scale.		
CHERRY. Rot, leaf diseases and injurious insects. Cut out and burn Black Knot six inches below affected part whenever seen.	Lime-sulphur wash or Poisoned Bordeaux. Before flower buds open. Kerosene emulsion or Whale-oil soap solution. For aphid.	Poisoned Bordeaux or Lime-sulphur wash. When fruit has set. (Important.)	Poisoned Bordeaux or Lime-sulphur wash. 10-15 days later. (Important.)
	If a late brood of the cherry or pear slug appears, spray with Arsenate of lead or Paris green.		
CURRENT. Leaf spot, "currant worm," currant aphid.	Paris green. When worms appear	Hellebore. When fruit is fully formed.	Bordeaux. After fruit is picked, and about two weeks later.
	For aphid, Kerosene emulsion, Whale-oil solution or Tobacco and soap wash.		
GOOSEBERRY. Mildew, leaf spot, "currant worm."	Copper sulphate or Lime-sulphur wash. Just before leaves open.	Poisoned Bordeaux or Potassium sulphide (1 oz. to 2 gals. water) or Lime-sulphur wash. Just before flower buds open.	Poisoned Bordeaux—Hellebore. Lime-sulphur wash or Potassium sulphide, when fruit has set, and about ten days later for American Gooseberry Mildew. (Important.)
	Spraying for American Gooseberry Mildew is not always effectual. Affected twigs should be cut off and burned.		

Dominion of Canada Spraying Calendar

PLANT.	1st Application.	2nd Application.	3rd Application.
GRAPE. Mildew, rot, anthracnose. "thrip" (or leaf-hopper).	Bordeaux. When third leaf shows. (Important.)	Bordeaux. Just before blossoms open. (Very important.)	Bordeaux. As soon as fruit has set. Kerosene emulsion. For leaf-hopper. (Very important.)
Later sprayings, the first about ten days after the third, may be necessary. When rot is prevalent, it is best to spray a few hours before rain than afterwards, to insure destruction of spores germinating very soon after rain.			
PEACH, APRICOT, NECTARINE. Rot, leaf-curl, shot-hole, scab, curculio, bud moth, bark borer, scale.	Lime-sulphur wash. Before buds swell. (Very important.)	Arsenate of lead. For curculio.	Self-boiled lime— sulphur wash about one month after fruit has set, and again about one month before fruit ripens.
Spraying will not control Yellows or Little Peach. Affected trees should be promptly removed.			
PEAR. Scab, cracking, leaf blight, codling moth, blister mite, "slug," pear psylla.	Copper sulphate. Before buds start. (Important.)	Poisoned Bordeaux. Just before blossoms open. (Important.)	Poisoned Bordeaux. Soon after blossoms fall. (Important.) If disease is showing, spray 10-12 days later and again in two weeks.
For pear psylla, Kerosene emulsion or Whale-oil soap just after leaves expand, and again in a week. If late brood of "Slug" appears use Arsenate of lead or Paris green.			
PLUM. Rot, scab, or blight, shot-hole, bud moth, curculio, aphid. Cut out and burn Black Knot six inches below affected part.	Lime-sulphur wash or Copper sulphate and Arsenate of lead, or Paris green. Before buds open. (Important.)	Lime-sulphur wash (1-40) or Poisoned Bordeaux. (3-4-40) Very soon after blossoms have fallen. (Important.) For curculio.	Lime-sulphur (1-40) or Poisoned Bordeaux. (3-4-40) 12-15 days later and again in about two weeks. Kerosene emulsion. Whale-oil soap, or Tobacco and soap wash. For aphid.
ROSE. Mildew, leaf blotch, "rose slug," "rose thrip," red spider.	Mildew in Greenhouse. Paint heating pipes with paste made of equal parts of sulphur, lime and water.	Leaf Blight. Ammon'l Copper carbonate "Rose Slug" Arsenate of lead or Paris green (1 oz. in 12 gals. water) or Hellebore.	"Rose Thrip." Aphid. Nicotine. Nicotine Sulphate. Kerosene emulsion, or Whale-oil soap. When "thrip" or aphid appear.
For red spider dust under sides of leaves with dry sulphur or mix sulphur with insecticides for aphid or thrips. Treat at short intervals until eradicated.			
RASPBERRY, BLACK-BERRY, DEWBERRY. Anthracnose, rust.	Copper sulphate Before buds burst.	Bordeaux. 10-15 days later.	Bordeaux. Soon after old canes are cut out.
Dig out and burn badly diseased plants.			
STRAWBERRY. Rust or leaf spot, white grubs.	Bordeaux. Just before blossoms open.	Bordeaux. Soon after picking season, or burn foliage.	Bordeaux. 10-15 days later.
To control white grubs, grow strawberries on one-year system.			
BEAN. Anthracnose, cutworms.	Use clean seed, free of disease. Spraying is not very effectual.	Bordeaux. When rough leaves appear.	Bordeaux. At intervals, 8-12 days later.
For cutworms, Poisoned bran.			

Dominion of Canada Spraying Calendar

PLANT.	1st Application.	2nd Application.	3rd Application.
CABBAGE, CAULIFLOWER, ONION, RADISH, TURNIP. Flea-beetle, caterpillars, aphids, root-maggots, cut-worms.	Paris green or arsenate of lead. For flea-beetle immediately plants appear above the ground. For root-maggots. Tar felt paper discs around stems of cauliflowers and cabbage. These should be put on immediately the plants are set out to prevent the fly from laying her eggs on the ground near the stem. The discs should lie flat on the ground and fit close to the stem. Insect powder or Hellebore in water poured about the roots at intervals of a week, and Carbolic emulsion have some effect in controlling root maggots of onions and radishes. Cut-worms—Use Poisoned bran for cut-worms. If scattered on surface of soil near plants to be protected the cut-worms will eat it in preference to the plants, and die.	Pyrethrum—dry mixture. For cabbage worms.	Kerosene emulsion or Soap washes. For aphids.
POTATO. Scab, rhizoctonia, blight and rot, insects.	Soak tubers in solution of corrosive sublimate or Formalin For scab.	Paris green. 8 ozs. or more to 40 galls. water; or Arsenate of lead, 3 lbs. to 40 galls. water or preferably 8 ozs. Paris green and 1½ lb. Arsenate of lead to 40 galls. water. For Colorado potato beetle.	Poisoned Bordeaux. For rot and beetles. From 15th July till end of season, 2 weeks apart. Keep foliage covered. Bordeaux for flea-beetle.
CELERY. Early and late blight.	Keep foliage constantly covered with Bordeaux throughout the season.		
ASPARAGUS. Rust.	Dust flowers of sulphur over and through the plants before the rust makes its appearance in summer. Two applications should be made each at the rate of about 150 lbs. per acre. The sulphur will adhere better if the plants are first sprayed with Whale-oil soap and water or resin sticker.		
TOMATO. Rot, blight, cut-worms.	Bordeaux. On plants in seed beds.	Bordeaux. On first appearance of rot.	Bordeaux. When necessary
Use Poisoned bran for cut-worms.			

INSECTICIDES

Internal Poisons (For Biting Insects)

Paris Green

Paris green 1 lb.
Unslaked lime 1 lb.
Water gallons 160

Dry Mixture.—One pound Paris green with 50 lbs. flour, land plaster, slaked lime or any other perfectly dry powder.

Poisoned Bran, for Cutworms—Mix ¼ lb. of Paris green thoroughly with 50 lbs. of slightly moistened sweetened bran.

Arsenate of Lead

Arsenate of lead.....lbs. 3 to 5
Water gallons 40

Mix thoroughly before using.

Hellebore

(Keep in Air Tight Vessel)

White hellebore Oz. 1
Water gallons 2

Or to be dusted undiluted over attacked plants.
For root maggots use 2 ounces of hellebore to 1 gallon water.

Carbolic Emulsion

Hard soap, well sliced.....lb. 1
Crude carbolic acid.....pint 1
Boiling water gallon 1

Dissolve the soap in water, then add the acid and churn violently with dasher. Before using, dilute to 35 gals.

Dominion of Canada Spraying Calendar

Contact Poisons (For Sucking Insects)

Pyrethrum (or Insect Powder)

(Keep in Air Tight Vessel)

Pyrethrum powder (fresh).....oz. 1
Water gallons 3

Dry Mixture.—Mix thoroughly 1 part by weight of Insect Powder with 4 of cheap flour, and keep in a close vessel for 24 hours before dusting over plants attacked.

*Nicotine Sulphate

(Containing at Least 40% Nicotine)
(For Aphids)

Nicotine sulphate oz. 1
Water gals. 6½

(Or 1 part to 800 to 1,000 of water)

It should be more concentrated for some species.

Nicotine (For Rose Thrip and Aphids)

Nicotine teaspoonful 1
Water gallon 1

Kerosene Emulsion (For Aphids, Scale and Other Sucking Insects)

Kerosene (coal oil).....gallons 2
Rain water gallon 1
Soap lb. ½

Dissolve soap in water by boiling; take from fire, and, while hot, turn in kerosene and churn briskly for 5 minutes. For use, dilute with 9 parts of water so that the above 3 gallons of stock emulsion will make 30 gallons of spraying mixture.

Flour Emulsion (For Aphids, Scale and Other Sucking Insects)

Kerosene quart 1
Flour ozs. 8
Water gallons 2

Stir together the flour and kerosene, then add the water, and churn violently for five minutes. To be used at once.

Whale-Oil Soap

For brown or black aphids....1 lb. in 4 gallons water
For scale-insects (young)....1 lb. in 5 gallons water
For green aphids or thrips....1 lb. in 6 gallons water

Tobacco and Soap Wash (For Aphids and Other Sucking Insects)

Soak in hot water for a few hours 10 lbs. of tobacco leaves (home-grown will do); strain off and add 2 lbs. of whale-oil soap. Stir until all is dissolved, and dilute to 40 gals. Apply early and two or three times at short intervals.

Lime Wash (For Oyster Shell Scale)

Unslaked lime.....lbs. 1 to 2
Water gallon 1

Strain through sacking before spraying. To be applied late in autumn.

Lime-Sulphur Wash (For San Jose Scale and Fungous Diseases)

Lime lbs. 20
Sulphur, powdered lbs. 15
Water to make.....gallons 40

Slake the lime with only enough water to do it thoroughly. Add the sulphur by dusting it over the lime while slaking; stir well and boil for at least an hour, adding only so much hot water as is necessary for easy stirring. When thoroughly cooked, strain through sacking, and apply hot.

Commercial Lime Sulphur

When commercial concentrated lime sulphur wash is used, it should be diluted for use, when there are no leaves on the trees, to 1 gallon of the concentrated wash to about 9 gallons of water, varying with the intensity of the wash. For use when there is foliage, the lime-sulphur should be diluted to 1 gallon of the concentrated wash to 35 to 40 gallons of water. Arsenate of lead is the best poison to use with the lime-sulphur wash. Arsenite of lime will injure foliage.

Concentrated Lime Sulphur.

This can be made at home instead of buying the commercial lime sulphur. With a formula of 50 lbs. fresh lime, 100 lbs. sulphur to 40 gallons of water. Heat the water to near boiling, then put in the lime and when it is slaked, add the sulphur, having first broken any lumps and screened it. Keep the mixture boiling well for an hour, when, if it has been frequently stirred, it should be in condition. Then replace water lost in boiling to make up forty gallons. Strain through a 20 to the inch mesh and store in barrels until needed. If barrels are not closed, covering the surface with oil will prevent evaporation. This is usually a little weaker than the commercial washes.

Use of the Hydrometer in Determining Proper Dilution of Concentrated Lime Sulphur

The hydrometer, which can be obtained from most druggists, with specific gravity readings, is a small instrument costing about \$1.00, which it is very desirable to use when lime sulphur is used as a summer spray, as different concentrated solutions vary somewhat in strength, and in dealing with tender foliage it is very essential to be sure of the strength one is using. To test the strength of the solution with the hydrometer, the latter is put in it when it is cool and any sediment has gone to the bottom, and the reading noted. The reading will indicate the density of the concentrate. To obtain the total dilutions required, the decimal of the reading of the concentrate is divided by the decimal of the strength required. For summer strength the reading should be 1.009 to 1.01.

* A preparation of this known as "Black Leaf 40" is offered for sale in Canada.

Dominion of Canada Spraying Calendar

Self-Bolled Lime Sulphur (Especially for Brown Rot Affecting Peaches)

Unslaked lime	pounds 8
Sulphur (flour or flowers).....	pounds 8
Water	gallons 40

Slake the lime in a barrel with a little cold water. After screening to break up lumps, put the sulphur in another vessel and add enough water to make a thin paste. Now pour the sulphur paste, or even the dry sulphur, slowly into the barrel containing the slaking lime. Stir the mass thoroughly and add enough cold water to keep the lime from sticking to the bottom of the barrel and to insure thorough slaking, but avoid using more water than is necessary until the lime is slaked, when enough water should be at once

added to cool the mass. Strain before spraying and add enough water to make up to the proportion in the formula. It is found that a desirable amount of heat is obtained by slaking 24 lbs. of lime with 24 lbs. sulphur at one time.

Alkaline Wash (For Borers)

Soft soap reduced to the consistency of thick paint by the addition of a strong solution of washing soda in water. If applied with a brush about the 1st of June on the morning of a warm day, this will dry in a few hours and form a tenacious coating not easily dissolved by rain.

If 1 pint of crude carbolic acid to the gallon of wash be added, it will make it more effective.

FUNGICIDES

Bordeaux Mixture (for Fungi)

Copper sulphate (Bluestone).....	lbs. 4
Unslaked lime	lbs. 4
Water (1 barrel).....	gallons 40

When spraying peach and plum foliage which may be injured by the ordinary formula, it is safer to use Bordeaux mixture in the proportion of 3 lbs. copper sulphate, 4 lbs. lime to 40 gallons water.

Dissolve the copper sulphate (by suspending it in a wooden or earthen vessel containing 4 or 5 or more gallons of water). It will dissolve more quickly in warm water than in cold. Slake the lime in another vessel. If the lime, when slaked, is lumpy or granular, it should be strained through coarse sacking or a fine sieve. Pour the copper sulphate solution into a barrel, or it may be dissolved in this in the first place; half fill the barrel with water; dilute the slaked lime to half a barrel of water, and pour into the diluted copper sulphate solution, then stir thoroughly. It is then ready for use. (Never mix concentrated milk of lime and copper solution.)

A stock solution of copper sulphate and milk of lime may be prepared and kept in separate covered barrels throughout the spraying season. The quantities of copper sulphate, lime and water should be carefully noted. Bordeaux mixture deteriorates with age and should be used as soon as made.

To test Bordeaux mixture, let a drop of ferrocyanide of potassium solution fall into the mixture when ready. If the mixture turns reddish-brown, add more milk of lime until no change takes place.

Poisoned Bordeaux Mixture

(For Fungi and Leaf-eating Insects)

To the 40 gallons of Bordeaux mixture prepared as above, add 4 to 8 ounces of Paris green, or 3 lbs. of arsenate of lead.

(For Potato Blight and Colorado Potato Beetles)
Instead of 4 lbs. copper sulphate, use 6 lbs.; and for potato beetles 8 ozs. or more of Paris green.

or 3 lbs. arsenate of lead, or preferably 8 ozs. Paris green and 1½ lbs. arsenate of lead to 40 gallons water.

Soda-Bordeaux (Burgundy Mixture) for Potato Blight and Rot

Copper sulphate (Bluestone).....	lbs. 6
Washing soda (Carbonate of soda).....	lbs. 7½
Water (1 barrel).....	gallons 40

Dissolve copper sulphate as for Bordeaux mixture. Dissolve 7½ lbs. washing soda in 4 gallons water. Pour the copper sulphate solution into a barrel, half fill the barrel with water, then stir in the solution of washing soda, and finally fill the barrel with water. It is now ready for use. The Soda-Bordeaux adheres better to the foliage when freshly made than the ordinary Bordeaux mixture, but it deteriorates rapidly in this respect and must be used as soon as made. If left standing for 24 hours it will have lost nearly all of its adhesiveness. The Soda-Bordeaux is not recommended in preference to the ordinary Bordeaux mixture, but where lime cannot be obtained it may be used with good results. Furthermore, on account of its freedom from gritty matter there is less likelihood of the nozzles becoming clogged when it is used. As washing soda is more expensive than lime, this mixture costs a little more than the ordinary Bordeaux mixture.

Note.—If the Soda-Bordeaux is used for spraying fruit trees, the formula is copper sulphate, 4 lbs.; washing soda, 5 lbs.; water, 40 gallons. Arsenical poisons should not be used with Soda-Bordeaux, as they may injure the foliage. Care should be taken to have exact quantities of washing soda and copper sulphate, as an excess of washing soda might result in injury to foliage.

Resin Sticker.

Resin	lbs. 8
Washing soda (Sal. soda, Carbonate of soda).....	lbs. 4
Water	gallons 4

Dominion of Canada Spraying Calendar

Dissolve 4 lbs. of washing soda in 4 gallons of hot water and then bring the solution to a boil. In another vessel melt 8 lbs. resin. When the latter is melted, pour it slowly into the boiling soda solution until all the resin is added, stirring it well at the same time. After all the resin is added, continue boiling for one hour or until a homogeneous mixture is obtained. If properly made, this will mix well with water or Bordeaux mixture. As some water will be evaporated in boiling, sufficient should be added to make the stock mixture 4 gallons.

Two quarts of the above stock mixture should be used with 40 gallons of Bordeaux mixture.

Resin sticker may be added to Bordeaux mixture (2 quarts to 40 gallons) and makes it adhere better to foliage.

Copper Sulphate Solution

(For Fruit Trees Before Buds Burst)

Copper sulphate (Bluestone).....lb. 1
Water gallons 20

As soon as dissolved it is ready for use. Use only before the buds open.

To destroy Wild Mustard, spray before bloom, with 5 lbs. in 20 gallons.

Ammoniacal Copper Carbonate

Copper carbonate ozs. 5
Ammonia quarts 2
Water (1 barrel).....gallons 10

Dissolve the copper carbonate in the ammonia. The ammonia and concentrated solution should be kept in glass or stone jars, tightly corked. It is ready for use as soon as diluted with the 40 gallons water. To be used when Bordeaux cannot be applied on account of staining the fruit.

Corrosive Sublimate and Formalin Solutions.

For Potato Scab or Rhizoctonia, soak the tubers before planting, either -

I. For 3 hours in a solution of Corrosive Sublimate 1 oz. in water 12 gallons. When dry, cut up for planting.

II. For 2 hours in a solution of commercial Formalin (Formaldehyde) 8 oz. in water 15 gallons; or 1 oz. in water 2 gallons.

Formalin has the advantage of being neither poisonous nor corrosive, while Corrosive Sublimate is a fatal poison if taken internally. It also corrodes metals. The solution should therefore be made in wooden or glazed vessels. It appears, however, to be more effective than formalin. Tablets may be procured at any druggist of such a size that one dissolved in a quart of water gives a solution of 1 to 2,000. All treated seed potatoes should be planted, and any solution left over should be poured into a hole in the ground. Selection of sound tubers is desirable as treatment is not always effectual.

N. B.—All the above recommendations are dependent on weather. If heavy rain falls immediately after spraying, applications should be repeated, but spraying shortly before rain is better than spraying after rain.

Always wash out thoroughly with clean water all pumps and nozzles immediately after using. The gallon referred to above is the Imperial gallon.

Several different formulae are recommended in some cases for the same insects or diseases. This is to make it easier for those in out of the way places to obtain at least one good insecticide or fungicide.

Total Areas and Values of Field Crops in Canada, 1910-14

From Dominion of Canada Census and Statistics Monthly

Provinces	AREAS				
	1910 Acres	1911 Acres	1912 Acres	1913 Acres	1914 Acres
Canada	30,279,376	34,545,672	35,575,550	35,375,430	33,436,675
P. E. Island.....	476,671	477,035	462,840	456,970	461,510
Nova Scotia	709,788	709,703	709,160	711,630	693,860
New Brunswick	952,085	978,530	931,990	906,130	904,055
Quebec	5,212,593	5,575,066	5,010,400	4,898,800	4,663,850
Ontario	9,288,078	9,648,905	9,349,000	9,200,000	8,973,700
Manitoba	4,534,784	5,134,987	4,971,400	4,965,500	4,671,790
Saskatchewan	6,817,841	8,614,102	10,315,800	10,307,600	9,238,000
Alberta	1,999,963	3,351,745	3,603,060	3,690,100	3,369,270
British Columbia.....	197,533	226,495	230,860	238,700	260,640

Provinces	VALUES				
	1910 \$	1911 \$	1912 \$	1913 \$	1914 \$
Canada	396,635,240	597,926,000	557,344,100	552,771,500	638,580,300
P. E. Island.....	6,681,110	9,099,300	9,456,000	9,535,500	11,544,000
Nova Scotia	11,430,300	17,174,500	19,420,000	17,132,300	21,969,700
New Brunswick	12,110,500	17,695,200	17,295,700	17,965,100	20,045,100
Quebec	76,325,000	106,218,000	69,901,000	88,589,000	99,279,000
Ontario	149,607,000	195,764,000	198,735,000	167,835,000	196,220,000
Manitoba	42,800,000	76,548,000	71,647,000	64,557,000	65,525,100
Saskatchewan	74,735,200	115,426,000	115,813,000	129,376,000	152,751,500
Alberta	16,150,000	48,475,000	44,503,400	46,712,000	59,779,600
British Columbia.....	6,746,000	11,496,000	10,593,000	11,069,000	11,463,000

DEPARTMENT OF AGRICULTURE OF CANADA

First Established as the Bureau of Agriculture, 1852

Minister The Honourable Martin Burrell.
Private Secretary.....William Ide, B.A.
Deputy Minister..Geo. F. O'Halloran, B.A., B.C.L.
Assistant Deputy Minister and Secretary.....
.....Lt.-Col. A. L. F. Jarvis, I.S.O.
Commissioner of Agricultural Instruction.....
.....C. C. James, C.M.G., M.A., LL.D.

The work of the Department is divided into several branches. Following is a brief outline of the work of each branch:

THE DOMINION EXPERIMENTAL FARMS BRANCH

Director, J. H. Griedale, B. Agr.

The Central Experimental Farm and twenty Branch Farms and Stations distributed over Canada, conducts research and experiments in animal, field, orchard, garden and greenhouse husbandry, distributes superior seeds, analyzes and tests fertilizers and feeding stuffs, studies diseases of plants and administers ordinances for their control, and demonstrates what methods are of value.

The Central Experimental Farm at Ottawa consists of 460 acres.

Branch Farms and Stations

Farms and Stations.	Extent, Acres.
Charlottetown, P.E.I.	100
Nappan, N.S.	300
Kentville, N.S.	294
Fredericton, N.B.	450
Ste. Anne de la Pocatiere, Que.	235
Cap Rouge, Que.	326
Farnham, Que.	60
St. Jacques d'Achigan, Que.	9
Harrow, Ont.	40
Brandon, Man.	625
Indian Head, Sask.	680
Rosthern, Sask.	152
Scott, Sask.	200
Lethbridge, Alta.	400
Lacombe, Alta.	490
Agassiz, B.C.	1,400
Invermere, B.C.	53
Sidney, B.C.	125
Total	5,939

Substations

1. Kamloops, B.C.
 2. Salmon Arm, B.C.
 3. Fort Vermilion, Alta.
 4. Fort Smith, N.W.T.
 5. Fort Resolution, N.W.T.
 6. Fort Providence, N. W. T.
 7. Athabasca Landing, N. W. T.
- Recently acquired for an Experimental Station at Lennoxville, Que., 430 acres.

THE DAIRY AND COLD STORAGE BRANCH

Commissioner, J. A. Ruddick

Encourages and assists in the development of the dairying industry and the improvement in the storage, transportation, sale and trade in agricultural products; administers the Dairy Industry Act (1914), the Cold Storage Act (1907), and the Cold Storage Warehouse Act (1914). Operates Dairy Stations at Finch, Ont., and Brome, Que., to demonstrate cheese and butter-making and the handling of milk and cream. Establishes Dairy Record centers (21 in operation in 1913). Prepares plans for creamery and cheese factory buildings, cold storages and dairies for farmers, distributes these free to those who apply for them.

THE SEED BRANCH

Commissioner, George M. Clark, B.S.A.

Encourages the production and use of superior seed, the production of farm and garden crops, tests seeds for farmers and seed merchants and administers the Seed Control Act. 20,000 tests made in one year at the Ottawa and Calgary laboratories. A year's report shows that 26 inspectors were employed. They visited 1,430 cities, towns and villages, inspected 4,012 seed dealers. Book on "Farm Weeds" placed in 18,000 rural schools. 50,000 copies of book on "Fodder and Pasture Plants" distributed.

THE LIVE STOCK BRANCH

Commissioner, John Bright

Encourages and assists the development of the live stock industry. Publishes comprehensive treatises on live stock husbandry, arranges lecture tours, assists in providing pure bred sires for use of farmers in newly settled districts where satisfactory male breeding animals have not otherwise been available. Has encouraged the Egg Circle Movement. Promotes sheep industry by improving breeding and marketing conditions.

THE HEALTH OF ANIMALS BRANCH

Veterinary Director General, Frederick Torrance, B.A., D.V.S.

Administers the Animals Contagious Diseases Act and the Meat and Canned Food Act. Protects Canadian live stock from contagious diseases. Maintains quarantine stations at Quebec, Halifax, St. John, Charlottetown, Vancouver, Victoria. Veterinary inspectors supervise inspection at border ports. Large staff supervises disinfection of stockyards and cars. Research stations at Lethbridge, Alberta, and Agassiz, B.C. Inspect meat and canned foods, evaporating plants, etc.

Department of Agriculture of Canada

ENTOMOLOGICAL BRANCH

Dominion Entomologist, C. Gordon Hewitt, D.Sc.

Conducts investigations on insects in relation to agriculture, encourages the use of methods of prevention and control and administers the Insects and Pests Section of the Destructive Insect and Pest Act.

THE FRUIT BRANCH

Commissioner, Donald Johnson

Encourages the development of the fruit industry along commercial lines. Also administers Part IX of the Inspection and Sale Act, relating to fruit and fruit packages. Publishes a monthly fruit crop report from May to September. Gives instruction in apple packing. Collects fruit for exhibit at international exhibitions. Supervises handling of perishable products.

THE INTERNATIONAL INSTITUTE OF AGRICULTURE

Canadian Commissioner, T. K. Doherty, LL.B.

Supplies Institute at Rome statistics and official information respecting agriculture in Canada and distributes in Canada, in the Bulletin of Foreign Agricultural Intelligence, corresponding information from fifty-two adhering countries.

THE PUBLICATIONS BRANCH

Editor and Chief, J. B. Spencer, B.S.A.

Distributes the publications of the Department and edits The Agricultural Gazette of Canada. Free bulletins on many subjects of an agricultural nature are sent out by this department. Letters containing requests for publications, or having reference to other official matters, do not require postage. The following is a list of bulletins of special interest. Address: Publications Branch, Department of Agriculture, Ottawa, Canada.

Free Bulletins

Publications of the Dominion Department of Agriculture

On Vitality of Seeds. Seed Distribution
Two-rowed Barley.
Two-rowed Barley, grown from Seed imported by the Government of Canada.
Indian Corn or Maize
Report on the Progress of the Work of the Experimental Farms.
The Cattle Horn Fly.
Ladoga Wheat.
Weeds.
The Stave Silo.
The Rape Plant.
Plum Culture.
Emmer and Spelt.
Alfalfa or Lucerne.
Trees and Shrubs Tested in Manitoba and the Northwest Territories.
The Potato and its Culture.
Bacon Pigs in Canada.
Quality in Wheat.
The Flax Plant.
Strawberry Culture.
Growing and Using Corn for Ensilage.
Mangels, Sugar Mangels and Forage Beets.
Progress in the Breeding of Hardy Apples for the Canadian Northwest.
The Honey Bee.
Cut Worms and Army Worms.
Milk Production in Canada.
Smut Diseases of Cultivated Plants.
Summary of Results, Cereals, 1913.
Summary of Results, Field Husbandry, 1911
Summary of Results, Division of Agronomy.
Summary of Results, Division of Horticulture.
Alkali Soils.
List of Herbaceous Perennials Tested in the Arboretum and Botanic Garden at the Experimental Farm, Ottawa.

Western Prairie Soils; their Nature and Composition.
Alfalfa Growing in Alberta.
The Control of Insect Pests in Canada.
The Large Larch Saw Fly.
Legislation in Canada to prevent the Introduction and Spread of Insects, Pests and Diseases Destructive to Vegetation with Regulations regarding Importation.
Experiments in Steer Feeding in Manitoba.
Corn Growing in Manitoba.
Preparing Land for Grain Crops on the Prairies.
How to Tell the Age of Hens and Pigeons.
Preliminary Survey of Forest Insect Conditions in British Columbia.
The Strawberry Root Weevil in B.C.
Preston and other Early-Ripening Varieties of Wheat.
Preparing Land for Grain Crops in Saskatchewan.
How to make and use a Hot Bed and Cold Frame; Top Grafting; How to Transplant a Tree or Shrub; Protection of Fruit Trees from mice and rabbits, and care of Injured Trees.
Asparagus, Celery and Onion Culture.
Ginseng, Mushroom and Melon Culture.
The Preservation of Fruits for Exhibition Purposes.
Hardy Rose Culture in Canada.
Tomato Culture.
Cabbage and Cauliflower Culture.
Potato Canker Imported into Canada.
Orange Hawk Weed.
Potato Canker.
Potato Diseases Transmitted by the Use of Unsound Seed Potatoes.
Powdery Scab of Potatoes.
Tent Caterpillars.
Flea Beetles and their Control.
The Chinch Bug in Ontario.

Department of Agriculture of Canada

- Inoculation for the Growth of Legumes.
Experiment Stations of the Province of Quebec.
Research Work at Harrow Experimental Station
in 1911.
- Report of Commissioner of Dairy and Cold Storage.
- List of some British Importers of farm products.
List of exporters of some Canadian products.
Some of the factors that control the water content of butter.
Sweet cream butter.
Apparatus for the determination of water and fat in butter.
Buttermaking on the farm, second edition.
The use of ice on the farm.
The cooling of milk for cheesemaking.
Cold storage and the Cold Storage Act.
Report on some trial shipments of cold storage apples.
Coulommier cheese—some notes on its manufacture.
Dairy legislation.
Trial shipments of peaches in 1910.
An historical and descriptive account of the dairying industry in Canada.
Notes for factory cheesemakers.
Cream cheese.
The care of cream for buttermaking.
Cow testing, with some notes on the sampling and testing of milk.
Modern Methods of Packing Apples and Pears.
Small cold storages.
Cold storage for creameries.
The Island of Orleans Cheese.
Co-operation and fruit growing.
List of cheese factories, creameries, skimming stations, also condensed milk and city plants in Canada.
The Inspection and Sale Act, Pt. IX as amended in 1907-8 and 1912-13.
Cheese Factory and Creamery Plans with Specifications.
The Milk Test Act.
The outlook for Canadian tomatoes in Great Britain.
Good reasons for cow testing.
Creamery cold storage bonuses.
List of wholesale and retail apple dealers in Manitoba, Saskatchewan and Alberta, and also in Kenora and Keewatin.
Amendment to the Inspection and Sale Act, 1913, as affecting fruit and regulations thereunder.
Notes on cow testing.
The Canadian record of performance for pure-bred dairy cattle, Reports 1, 2, 3, 4, 5.
The cattle trade of Western Canada.
A directory of the breeders of pure-bred live stock of the Dominion of Canada.
Sheep husbandry in Canada.
Beef raising in Canada.
Horse breeding and rearing of colts.
Observations upon Government assistance to agriculture in certain countries of Europe.
The care of market eggs.
Winter egg production.
The crate fattening of poultry.
The candling of eggs.
- Rules for the production and marketing of new-laid eggs.
The importance of the removal of male birds after the breeding season.
Suggestions for Egg Circle Members.
Tuberculosis; a plain statement of facts regarding the disease, prepared especially for farmers and others interested in live stock.
Bulletin on contagious abortion.
Regulations relating to rabies.
Regulations relating to sheep scab.
Regulations relating to actinomycosis.
Regulations relating to anthrax.
Regulations relating to glanders.
Regulations relating to hog cholera.
Regulations relating to mange.
Regulations relating to maladie du coit.
Regulations relating to tuberculosis.
Quarantine regulations.
Regulations relating to transportation of animals and transfer of stock cars between Canada and the United States.
Fees for inspection of animals imported to Canada.
Canadian Meat Inspection Service.
Directions for cleansing and disinfecting premises after outbreaks of hog cholera.
Instructions for sending specimens for microscopic examination.
Notice—Glanders.
Regulations governing the inspection of meats.
Special report on glanders.
Special report on maladie du coit or dourine.
Special report on Pictou cattle disease.
Special report on Sarcosporidiae and their association with "loco" disease and dourine.
Vaccin du charbon, Anthrax serum.
Foot and Mouth Disease.
Maladie du Coit.
Mange in horses and cattle.
Anthrax and Blackleg.
Rabies.
Hog Cholera.
Warble Flies—the economic aspect and a contribution on the biology.
Seed testing.
The production and use of seed grain.
Seed corn, field root and garden seeds—seed trade investigation.
Wild oats and false wild oats, their nature and distinctive characters.
Weed seeds.
The Seed Control Act with Regulations.
The Maple Sugar Industry in Canada.
- ### Education
- Agricultural Instruction Act: Passed in 1912: it provides for the expenditure of \$10,000,000 during a period of 10 years, out of the Consolidated Revenue Fund of Canada, "for the purpose of aiding and advancing the farming industry by instruction in agriculture." The first apportionment for the fiscal year ending March 31, 1914, was \$700,000. For the year 1914-15 the appropriation is \$800,000; 1915-16, \$900,000; 1916-17, \$1,000,000; 1917-18 and succeeding years of the period, \$1,100,000. The act provides that a sum not exceeding \$20,000 each year shall be paid to assist

Department of Agriculture of Canada

the work of veterinary colleges. The appropriations for 1913-14 and 1914-15 were apportioned as follows:

	1913-14	1914-15
Prince Edward Island.....	\$ 24,529.85	\$ 27,832.81
Nova Scotia	54,288.45	61,144.45
New Brunswick	44,509.93	49,407.20
Quebec	159,482.40	187,409.16
Ontario	195,733.32	230,868.83
Manitoba	51,730.06	58,075.45
Saskatchewan	54,298.29	61,152.31
Alberta	46,094.95	51,310.41
British Columbia	47,334.76	52,799.38
Veterinary Colleges	20,000.00	20,000.00
Total	\$700,000.00	\$800,000.00

This is, of course, in addition to the appropriations made by the provinces from their own provincial revenues.

Dominion Agricultural Appropriations

Total for the year 1913-14, \$3,358,525.

Traveling Libraries: Macdonald College, Quebec, sends out cases of books to Quebec Home-makers' Clubs, 35 books in a case, 34 on household science subjects and the remainder standard fiction, poetry, biography.

McGill University, Montreal, sends out three classes of traveling libraries (a) general libraries, (b) libraries for young people, (c) libraries on

special subjects. These are supplied to (a) country schools, (b) public libraries, (c) reading or literary clubs, communities having no free library.

In Ontario the Public Library's Branch of the Department of Education sends out over 200 of these libraries a year.

Manitoba distributes books to Home Economics Societies from its circulating library and has also two traveling libraries.

Saskatchewan sends libraries from the Traveling Library Office at Regina. There must be an organized body responsible for the receiving, care, distribution and return of the library. The University of Saskatchewan sends books to home-makers' clubs.

British Columbia supplies traveling libraries to Women's Institutes.

British Columbia has 214 traveling libraries which are loaned to Farmers' Institutes, Women's Institutes, school Y. M. C. A., mission steamers, survey steamers, etc.

Growing Field Root Seed: In 1913 Canada imported 200,713 lbs. of beet and mangel seed, 350,489 lbs. of turnip seed, 32,966 lbs. of carrot seed from European countries—Germany, France, Holland. Yarmouth, N.S., has grown turnip seed for a number of years, average 1,100 lbs. per acre. Waterloo County, Ont., has grown seed of mangels, carrots and sugar beets for a number of years. This industry has marked possibilities in Canada.

Protect the Birds

They Protect You

Birds eat injurious insects.

Injurious insects destroy leaves, fruits, grain.

Yearly loss to Canada by injurious insects—about \$100,000,000.

Help to stop this loss by protecting birds.

Write the Secretary of the Canadian Society for the Protection of Birds for information.

Address: **PROVINCIAL MUSEUM,
NORMAL SCHOOL, TORONTO.**

Growing Food on Vacant Lots

The following statement of the work carried on in 1914 on vacant city lots in Regina has been prepared by W. W. Andrews, the Chairman of the Committee:

"Our method of handling the vacant lots is by a committee of which I am chairman. Our secretary finds out from owners if they are reasonably sure that they will not build on their land during the coming season, and if they are willing to let us have the land for our purposes.

"Then we arrange to plough and harrow it. This costs us 80 cents per lot. (It cost us much more at first.) We charge \$2.50 for the use of lot, plowing and harrowing and we give some flower seeds to be sown in the 10 feet near the street. Some of the lots were very beautiful. We formed a co-operative society among the gardeners and they bought their seeds co-operatively. We carried on a series of lectures and

talks on the conditions of success in Western gardening. These were held in the school houses and were the first social center work in the school houses. These meetings were attended and the discussions were very interesting. We pay our secretary \$50 for his trouble.

"We have now 160 lots ready for the spring. We had some city property which is now used by the city for nursery purposes. Next year we expect to add a large number of lots to our list.

"We were able to run a small market of our own—co-operatively managed and this move led with the co-operation of the ladies' association to the re-opening of the city market.

"We hope to reduce somewhat the fee of \$2.50. It is very small considering the results the gardeners yield.

"I had one garden and so also had some others

Department of Agriculture of Canada

of our committee. My little 25 foot lot kept our table supplied all summer with abundance of green stuff, lettuce, Swiss chard, spinach, peas, beans, tomatoes, corn, onions, carrots, turnips, celery, potatoes and cabbage, enough to do us all winter. The soil here is wonderful in its fertility.

"We used the newspapers freely. Our secretary was most indefatigable. The chairman and secretary necessarily do most of the work. Some of the stores gave plants, tools and special seeds at reduced prices to all who presented one of our cards.

"We have decided to recommend all our gardeners who use hot beds and cold frames to use glass and to use factory cotton instead. It costs less, does not grow so hot during the day nor so cool at night. The plants get more air and are in every way harder and stand transplanting better.

"One edge of the factory cotton we tack to the higher side of the frame and the other edge is tacked to a lath or roller. The cotton is in this way easily rolled up and when spread over the frame the weight of the roller keeps it in place. Lath may be used as rafters to keep it from sagging during a rain and injuring the plants."

Dr. C. C. James, Agricultural Commissioner for Canada, in discussing this topic said:

"This task is not limited to the farmers. There is a task laid upon all towns and cities. These have been growing and expanding, extending their boundaries, until today there must be, at least, one hundred thousand acres lying idle, unproductive, but cultivable in our towns and cities. Living nearby are tens of thousands out of work. Schemes have been suggested of taking the landless men out to the manless lands to grow wheat. That would probably cost \$2 to grow \$1 worth of wheat. It would not be economical—a waste of men and money.

"Why take these men in thousands to the land

to grow crops about which they know nothing when right at their doors are vacant lands that will produce food? Surely the cities can secure the use of this vacant land, and set some of the unemployed at work growing potatoes and other vegetables, crops that require labor all through the summer. Under proper supervision men with little or no farming experience can be used to produce food of this kind. They will be paid for their work and a double purpose served. Every ton of food thus produced releases another ton for export.

Among the city unemployed there may be many who would gladly help the farmers and who would be of some real value. Schemes for placing men of some farming experience with farmers who need help should receive attention in every city. It seems so easy now to organize committees for relief work abroad. Why not turn some of this organizing energy and enthusiasm into relief at home along these lines? Committees of this kind should have rural representatives on them, including officers of the women's institutes who have recently proved their efficiency."

Vacant Lot Gardens

Chatham, Ont.—Vacant lots owned by city are given free for cultivation.

Hamilton, Ont.—Has a Garden Club in charge of a civic committee.

Calgary, Alta.—Has a Vacant Lots Garden Club.

In the season of 1914, twenty-five foot city lots were cultivated by 174 gardeners who paid \$1 per lot cultivation charges. The land was furnished free by the owners. Marked success attended the movement and probably \$5,000 worth of produce was grown, though this is a very conservative estimate.

Edmonton, Alta.—Property Owners' Association is giving vacant property free for gardening.

Ornamental Trees, Shrubs and Flowers

Some of the trees, shrubs, and perennial flowers which could be most easily raised and which are perhaps most suitable for school and home surroundings are as follows:

From Seed

1. **Trees:** Sugar Maple—White Spruce—Green Ash—Norway Maple—Scotch Pine—Manitoba Maple (for the Prairie Provinces)—Basswood—Arbor-Vitae or Cedar.
2. **Small Trees:** Siberian Pea Tree—Mountain Ash—Japanese Tree Lilac.
3. **Shrubs:** Japanese Barberry—Japanese Rose—Bush Honeysuckles—Wayfaring Tree—Common Lilac—Snowberry.
4. **Perennial Flowers:** Columbine—Shasta Daisy—Blanket Flowers—Pinks—Hollyhocks—Pinks—Bell-flowers—Sunflowers—Foxgloves—Oriental Poppies—Larkspurs—Coreopsis

From Cuttings.

5. **Trees:** Poplars—Willows—Arbor-Vitae or Cedar.
6. **Shrubs:** Van Houtte's Spiraea—Honeysuckles—Flowering Currant—Privet—Mock Orange—Dogwoods.
7. **Self-fastening Virginian Creeper.**

Note: On account of the hardness and thickness of the seed coat of such seeds as the Basswood, and sometimes the Japanese Rose, it has been found that the seed when sown in the autumn, soon after ripening, will not germinate in the spring with the seeds of other plants. It remains dormant in the ground for a year and a half. Most of it will germinate, however, in the second spring.

Cuttings of the willows and poplars will root in any good moist soil, but those of the cedars and most of the shrubs will succeed best in a

Department of Agriculture of Canada

moist, sandy soil. All cuttings should be kept shaded.

Cuttings of currants, both the red and black varieties, will root very easily.

	No.	Value.
Horses	2,947,738	\$371,450,361
Milk cows	2,673,286	153,632,637
Other cattle	3,363,531	143,498,156
Sheep	2,058,015	11,550,710
Swine	3,434,261	42,418,325

Stock of Wheat in Canada: February 8, 1915, estimated at 79,130,539 bushels, of this 29,554,000 was still in farmers' hands.

Beechroot Sugar: (1914) 108,600 tons of roots from 12,100 acres, value \$651,000; refined beechroot sugar production, 27,545,748 lbs.

Loss From Insect Pests

Live Stock in Canada (1914)

Estimating from our statistics of production and the known percentage of losses due to insect pests, it can be shown that, taking the minimum average loss, the annual loss in Canada due to the depredations of insect pests on field, vegetable and fruit crops, live stock, stored grains and forest products is, on a conservative estimate, considerably over one hundred million dollars (\$100,000,000). A very great portion of this loss could be prevented even with our present limited knowledge of control methods.—C. Gordon Hewitt, Dominion Entomologist.

The Maple Sugar Industry

This is distinctly a Canadian industry. The maple leaf is the Canadian emblem, and maple sugar essentially a Canadian product. The average annual sugar output of Canada was about 19,600,000 lbs. during the decade 1901-1911; of this, Ontario contributed 5,000,000 lbs. The average selling price has been about 10 cents per lb. Canada supplies three-sevenths of the world's output. The trees are generally tapped in the latter part of March and April. Moderately warm days followed by freezing nights are ideal conditions to promote flow. Seasons vary, but the cost of fitting up a modern sugar camp is a paying investment even at low market prices.

The adulteration of maple products necessitated the passing of a special clause in the "Adulteration Act." This prohibits the manufacture or sale of any sugar as pure maple sugar, or any syrup as pure maple syrup, which does not come up to the prescribed standards. The standards for maple products are defined as follows:

(1) Standards for Maple Sugar

"Maple sugar shall be entirely the solid product resulting from the evaporation of maple sap, or of maple syrup, and contain not more than ten (10) per cent of water; and yield not less than six-tenths (0.6) of one per cent of ash, reckoned on the dry matter of the sugar when incinerated in such a way as to assure the earths being present as salts and not as oxides, and not less than twelve one-hundredths (0.12) of one per cent of ash, insoluble in water, employed as described below and yielding a lead number not less than one and

seven-tenths (1.7) when worked by the Canadian method, nor less than one and two-tenths (1.2) when worked by the Winton method.

"Minute traces of substances such as gelatine, albumen, isinglass, etc., which may have been employed as refining or clarifying agents in manufacture, shall not be regarded as adulterants."

Standard for Maple Syrup

"Maple syrup shall be syrup made by the evaporation of maple sap, or by the solution of maple concrete in water, and contain not more than thirty-five (35) per cent of water. The dry substance of maple syrup shall meet all the above standards for maple sugar."

The Province of Quebec, owing to its situation, is still the country "par excellence" for the production of maple sugar and syrup, a product which is unique of its kind in the world and which cannot be had outside of the eastern provinces of Canada and some contiguous states to the south. The Province of Quebec, being situated in the very center of the maple growing zone, produces a large quantity of sugar and syrup. With a view to bring together all those who are engaged in the industry in the Province, a co-operative society has been formed at Waterloo, Que. In order to develop this national industry and improve the quality of the products, the Minister of Agriculture has established three sugar-making schools, where instructions will be given on the best methods of making, and on the marketing of the products. These three schools are situated at Beauceville, Beauce County, at Sainte-Louise, L'Islet County, and at La Minerve, Labelle County.

What an Acre Should Grow

The possibility of increased production is shown by the following table compiled from recent records. The "possible" crop is arrived at by taking the results obtained at the experimental farms and by many farmers, under intensive cultivation

	Average	Possible
Fall wheat	20.43	52.00
Spring wheat	14.84	37.00

Barley	16.15	49.00
Oats	35.30	91.00
Coat grain	70.00	200.00
Coat ensilage (tons)	12.00	19.00
Peas	15.33	37.00
Beans	18.79	50.00
Potatoes	119.40	450.00
Turnips	421.81	1,000.00

Relief Map Showing Mountains, Oceans, Lakes, Rivers and Plains

HARVEST TIME IN DIFFERENT PARTS OF THE WORLD.

In January the wheat is harvested in Australia, New Zealand, Chile and the Argentine Republic.

In February and March the harvest has extended into upper Egypt and India.

In April it is in lower Egypt, India, Persia, Syria, Asia Minor, Cyprus, Mexico and Cuba.

In May it reaches perfection in Algeria, Central Asia, China, Japan, Morocco and Texas.

In June it has reached into Oregon, California, Alabama, Mississippi, Georgia, North Carolina, South Carolina, Virginia, Kentucky, Tennessee, Kansas, Arkansas, Colorado, Utah, Missouri, Turkey, Greece, Italy, Spain, Portugal and the south of France.

In July it has extended into New Zealand, New York, Pennsylvania, Ohio, Indiana, Michigan, Illinois, Iowa, Wisconsin, Southern Minnesota, Nebraska, Upper Canada, Roumania, Bulgaria, Austria, Hungary, South of Russia, Germany, Switzerland and the South of England.

In August the harvest is actively going forward in Central and Northern Minnesota, Dakota, Manitoba, Lower Canada, Columbia, Belgium, Holland, Great Britain, Denmark, Poland and Central Russia.

In September and October it has reached up into Scotland, Norway, Sweden and the North of Russia.

In November it is proceeding in Peru and South Africa, and in December it is in Burmah.

FOREIGN CITIES, DISTANCES FROM CHICAGO.

	MI.
Amsterdam, Holland	4,897
Antwerp, Belgium	4,912
Athens, Greece	4,567
Berlin, Germany	5,117
Bremen, Germany	5,117
Brindisi, Italy	6,117
Brussels, Belgium	4,897
Christiania, Norway	5,501
Constantinople, Turkey	6,721
Calcutta, India	12,022
St. Helena, West of Africa	10,192
Bahia, Brazil	6,721
Bermuda, E. of I.	84,692
Colon, Columbia	3,717
Havana, Cuba	2,812
Livingston, Guantemala	3,167
Nassau, Bahama Is.	2,067
Rio Janeiro, Brazil	7,012
Singapore	11,322
Tampico, Mexico	3,167
Adelaide, Australia	11,033
Hongkong, China	9,672
Honolulu, Sand. Is.	4,723
Melbourne, Aus.	11,353
Yokohama, Japan	7,812
Wellington, N. Zealand	9,672

Part of the Western Hemisphere, including North American Continent.



Map of the North American Continent.

Occupied, two thousand or more years ago, by the Mount Builders; more recently by the red men called Indians, opened to civilization by Christopher Columbus, who discovered the Bahama Islands, October 12, 1492.

This map and three others taken from "Hill's Guide," by Thomas E. Hill, published by Laird & Co., Chicago, Ill.

When examining the map of North America figures will be found extending from left to right, beginning with A 1 and A 2 in the Arctic regions, succeeding which are B 1, C 1, D 1, E 1, F 1, G 1, H 1, I 1, J 1, K 1, L 1, M 1, N 1, O 1, P 1, Q 1, R 1, S 1, T 1, U 1, V 1, W 1, X 1, Y 1, Z 1. In the regions south of latitude 80; while south of latitude 70 are C 1, D 1, E 1, F 1, G 1, H 1, I 1, J 1, K 1, L 1, M 1, N 1, O 1, P 1, Q 1, R 1, S 1, T 1, U 1, V 1, W 1, X 1, Y 1, Z 1. Letters and figures on the map indicate important localities. By examining the map the letters and figures will be readily found indicating points that are thus described.

Localities and Objects Designated on Map by Letters and Numbers

- A 1. North Pole.** **E 28. Quebec, Can.**
A 2. Highest Point of Arctic Ex- E 29. Nova Scotia.
 plication. **E 30. G. I. of St. Lawrence.**
- B 1. Point Barrow.** **E 31. Newfoundland.**
B 2. Cape Sabine. **F 1. San Francisco.**
B 3. Baffin's Bay. **F 2. Sierra Nev. Mts.**
B 4. Greenland. **F 3. San Diego.**
B 5. Spitzbergen. **F 4. Salton Lake.**
C 1. Siberia, Russia. **F 5. Colorado River.**
C 2. Behring's Strait. **F 6. Mex. Boundary.**
C 3. Alaska. **F 7. Rocky Mts.**
C 4. Yukon River. **F 8. Denver, Colo.**
C 5. Can. Dominion. **F 9. Santa Fe.**
C 6. McKenzie River. **F 10. Indian Ter.**
C 7. Gt. Bear Lake. **F 11. Arkansas River.**
C 8. Gt. Slave Lake. **F 12. Red River.**
C 9. Hudson Bay. **F 13. Mississippi River.**
C 10. Hudson Strait. **F 14. St. Louis, Mo.**
C 11. Davis Strait. **F 15. Ohio River.**
C 12. Iceland. **F 16. Cincinnati, O.**
C 13. Norway. **F 17. Allegheny Mts.**
C 14. Arctic Circle. **F 18. Charleston, S. C.**
D 1. Mt. St. Elias. **F 19. Cape Cod.**
D 2. Mt. Fairweather. **F 20. Washington.**
D 3. Sitka, Alaska. **F 21. Boston, Mass.**
D 4. Mt. Brown. **F 22. New York City.**
D 5. Lake Winnipeg. **F 23. Atlantic Ocean.**
D 6. Winnipeg. **G 1. Pacific Ocean.**
D 7. Lake Nipigon. **G 2. Gt. Lakes.**
D 8. Labrador. **G 3. Trop. of Cancer.**
D 9. Strait of Belle Isle. **G 4. Low Water.**
E 1. Vancouver Is. **G 5. Gt. of California.**
E 2. Victoria, B. C. **G 6. Mexico.**
E 3. Mt. St. Helena. **G 7. Sierra Madre.**
E 4. Portland, Ore. **G 8. Rio Grande.**
E 5. Columbia River. **G 9. Monterey, Mex.**
E 6. Boundary Line. **G 10. Gulf of Mexico.**
E 7. Salt Lake, Utah. **G 11. Galveston, Tex.**
E 8. Yellowstone Pk. **G 12. New Orleans.**
E 9. Missouri River. **G 13. Florida.**
E 10. Dakota. **G 14. St. Augustine.**
E 11. St. Paul, Minn. **G 15. Havana.**
E 12. Duluth, Minn. **G 16. Cuba, W. India.**
E 13. Lake Superior. **G 17. Watling Island.**
E 14. Mackinac. **H 1. Mexico City.**
E 15. Lake Michigan. **H 2. Pecos River.**
E 16. Chicago. **H 3. Vera Cruz, Mex.**
E 17. Lake Huron. **H 4. Yucatan, S. A.**
E 18. Detroit, Mich. **H 5. Guatemala.**
E 19. Lake Erie. **H 6. Honduras.**
E 20. Cleveland. **H 7. Nicaragua.**
E 21. Buffalo, N. Y. **H 8. Caribbean Sea.**
E 22. Lake Ontario. **H 9. Jamaica.**
E 23. Montreal, Can. **H 10. Haiti, W. India.**
E 24. New York, N. Y. **I 1. Isth. of Panama.**
E 25. Boston, Mass. **I 2. Aspinwall.**
E 26. Mt. Washington. **I 3. U. S. of Colombia.**
E 27. St. Lawrence R. **I 4. Venezuela, S. C.**
E 28. Equator.

Description of Notable Objects on the North American Continent.

- A 1. The North Pole.** An imaginary point where the lines of longitude are supposed to converge.
- A 2. The Point Near the North Pole.** Reached by Arctic navigators, being Lockwood Island discovered by the Greely expedition in May 1883 and supposed to be about 450 miles from the North Pole. Erik Ruess to get supplies, the expedition started southward, and camped at Cape Sabine (see B 2) about 420 miles southward of Lockwood Island where they were rescued in a long condition by the relief expedition under guidance of Commander W. S. Schley, being rescued alive, 17 having died before relief arrived.
- B 1. Point Barrow.** The northernmost point of Alaska, and the most northern point of the United States possessions.
- B 2. Cape Sabine.** A locality that will always be notable as the place where the only expedition went to camp and waited for relief, which did not come until the majority of the party had died.
- B 3. Baffin's Bay.** So named after William Baffin, who first explored the region in 1616. It is a large inland sea, 1,000 miles long and 300 miles wide.

B 4. Greenland. A region of unknown extent northward, said to have been discovered in the ninth century by an Icelandic. Dr. Kane extended his explorations northward, across Greenland to within 520 miles of the North Pole. The whole face of the northern portion is covered with a sheet of ice and snow. Greenlanders are widely scattered throughout the colder regions of the north.

B 5. Spitzbergen. A group of islands covering about 20,000 English square miles. Covered with nearly perpetual snow and glaciers.

C 1. Siberia. A vast territory in North Asia, belonging to Russia, 4,000 miles long and 2,600 wide.

C 2. Behring's Strait. Extended by Vitus Behring in 1728, and is 50 miles wide from Alaska to Siberia with the uninhabited island nearly midway between. The water is 120 feet in depth. With a road spanning the distance between Alaska and Siberia, either above water or in a tunnel under the water, nearly all portions of the world could be traversed by continuous railways.

C 3. Alaska. Belongs to the United States, contains 585,802 square miles. Population in 1900, 63,762. A small proportion are whites. Purchased of Russia in 1867, for \$7,200,000. Alaskan waters are the home of the fur seal, the largest whales about 700 pounds.

C 4. Yukon River. The principal river of Alaska, rises in the Rocky Mountains in the Canadian Dominion, flows 2,000 miles, and empties into the Pacific Ocean some 400 miles south-west of Behring Strait.

C 5. Canadian Dominion. A vast area of country in the northern part of North America, usually designated as British America, contains 3,500,000 square miles, extending from the Atlantic to the Pacific Ocean, and from the United States to the Arctic Ocean. Population in 1901 was 5,528,847.

C 6. Mackenzie River. An important river of British America, 1,775 miles long, runs through Athabasca and Great Slave Lakes, and empties into the Arctic Ocean.

C 7. Great Bear Lake. By observing a perfect map of North America it will be seen that a chain of lakes extends from the Arctic Ocean near Alaska eastward to the Gulf of St. Lawrence. The most northerly of these is Great Bear Lake, the area of surface of which is estimated to be 14,000 square miles.

C 8. Great Slave Lake. Next, south of Great Bear, is Great Slave Lake, 300 miles in length by 50 in width, and like other lakes in this region, wholly frozen over for six months in the year.

C 9. Hudson Bay. A great inland sea, on the borders of which the Hudson Bay Company, which was established in 1670, held control until 1869, at which time their possessions were transferred to the Dominion of Canada for the sum of \$1,500,000, they only retaining their trading posts and a small amount of land around each post.

C 10. Hudson Strait. Is a body of water joining Hudson Bay with the Atlantic Ocean; is 450 miles in length, by 60 miles in width.

C 11. Davis Strait. So called from the name of the navigator who first discovered it. Connects Hudson Bay with the Atlantic Ocean, being at its narrowest point 100 miles in width.

C 12. Iceland. An island 300 miles in length by 200 miles in width. In the northernmost part of the Atlantic in the confines of the Arctic Ocean, belongs to the kingdom of Denmark. Is about 800 miles from Norway and 300 from Greenland. Settled by Norwegians in the latter part of the ninth century, has thus been open to civilization over 1,000 years. Possessed once a climate much more warm than now.

In spite of cold and poverty its people have been noted for literary attainments and scientific acquisitions. Population, 200,784.

C 13. Norway. Formerly formed with Sweden one joint kingdom; is 1,100 miles long and 250 miles wide. Has however, its own government, legislative machinery, army and navy, after the manner of each separate State in the United States.

C 14. Arctic Circle. A circle drawn around the North Pole which is supposed to divide the Arctic regions from the temperate zone.

D 1. Mt. St. Elias. A volcanic mountain between Alaska and British America; is 19,000 feet in height and is one of the highest peaks in North America.

D 2. Mt. Fairweather. In southeast Alaska is 15,000 feet or 2½ miles in height.

D 3. Sitka. The former capital of Alaska, on the coast is one of the most important parts of that territory.

Points of Interest in the Central Part of North America

D 4. Mt. Brown. Is 15,000 feet high, in the Rocky Mountains, near Mt. Hooker, in the same range of mountains, the latter being 15,675 feet in height.

D 5. Lake Winnipeg. Is 90 miles north of Minnesota, is 284 miles long, 85 miles wide.

D 6. Winnipeg. Capital of Manitoba, celebrated for its schools and advanced civilization. Population, 1901, 90,204.

D 7. Lake Nipigon. An important lake at the head of Nipigon River, renowned as a resort for Ishmael.

D 8. Labrador. A portion of the North American continent supposed to have been visited by the Northmen in the ninth century, is a cold, fogged region a large portion of the year, and is settled largely by the Esquimaux. Is under English rule.

D 9. Strait of Belle Isle. A narrow neck of water separating Labrador from Newfoundland.

E 1. Vancouver Island. Is 270 miles long, 50 miles wide, and has, with its chief town, Victoria, a large and growing population. Under British rule.

E 2. Victoria. Capital of the province of British Columbia, stands at the southern extremity of Vancouver Island.

E 3. Mt. St. Helena. In the southwest of Washington State, 13,400 feet high. Mt. Hood, in northern Oregon, is 11,235 feet high.

E 4. Portland, Ore. Population 1900, 90,426. This is a region owing to mild, moist and favorable climate, of remarkable fruit and vegetable production.

E 5. Columbia River. Largest stream on the western coast of the United States, being 1,000 miles long.

E 6. Boundary Line, between the United States and the British Dominion.

E 7. Salt Lake. An extensive sheet of salt water, 70 miles long and 30 miles wide, having an average depth of 7 or 8 feet, and nowhere over 20 feet in depth. Its surface is over 4,200 feet above the sea. Nine islands are found in this lake, some of which are 3,200 feet above the level of its surface. No living creature is found in its waters which constitute one of the purest and most concentrated brines in the world. Receives fresh water from two sources, but has no outlet.

E 8. Yellowstone Park. Is 65 miles long and 55 miles wide, contains from 5,000 to 10,000 springs and 50 rivers that throw water to a height of from 50 to 200 feet. Was set apart by Congress as a public park in 1872.

E 9. Missouri River. The longest of the great rivers in the world, rises in the Rocky Mountains in Montana, runs north 200 miles, then east 1,200 miles, thence south to the mouth of the Kansas River, thence east to the Mississippi River, and in the Union with the Mississippi to the Gulf of Mexico. Its entire length being 4,500 miles. It is high 100 feet above the sea, in high water up from the Mississippi.

E 10. Dakota. So called from the Dakota Indians, was set apart as a territory in 1861, and admitted into the Union as two states in 1889. Abundant wheat-growing region.

E 11. St. Paul. Population 1900, 103,065.

E 12. Duluth. Population, 1900, 52,909.

E 13. Lake Superior. Is the largest body of fresh water in the world, being 355 miles long and 160 wide, is 600 feet above the level of the sea, its average depth is 1,000 feet, its bottom thus being 400 feet below the level of the sea.

E 14. Mackinac. An island located at the northern extremity of Michigan, in the Straits of Mackinac, is a national park 3 miles long by 2 miles wide, is much frequented as a summer resort.

E 15. Lake Michigan. The second in size of the great fresh water lakes, lies wholly in the United States, 240 miles long and 88 miles wide in some places.

E 16. Chicago. In the vicinity of Chicago, and to the westward, throughout the Mississippi valley, are the great prairies where the rank growth of vegetation has blossomed and gone to decay, every year for centuries, creating a wonderfully fertile soil, adapted to the growth of that important cereal known as corn.

E 17. Lake Huron. One of the five great lakes, separates the Canadian Dominion from the State of Michigan. Area, 29,000 square miles. Depth, 1,000 feet. Its surface is 584 feet above the level of the ocean. Contains 3,000 islands.

E 18. Detroit. Population, 1900, 285,704.

E 19. Lake Erie. Length, 240 miles, breadth, from 30 to 40 miles. Average depth about 120 feet.

E 20. Cleveland. Population, 1900, 381,708.

E 21. Buffalo. Population, 1900, 352,387.

E 22. Lake Ontario. Easternmost of the five great lakes, is 190 miles long and 55 miles wide, being, in some places, 600 feet deep.

E 23. Montreal. The largest city of Canada, 400 miles from New York, 180 miles from Quebec, and 2,750 miles from Liverpool, England. Population, 1901, 267,730.

E 24. New York City. Population 1901, 3,948,191.

E 25. Boston. Population, 1904, 688,482.

E 26. Mt. Washington. One of the highest of the White Mountains in the State of New Hampshire, is 6,288 feet high, has a carriage road and railway to its summit on the top of which is a signal service station and a hotel.

E 27. St. Lawrence River. Rises at the lower end of Lake Ontario and empties into the Gulf of St. Lawrence, being 750 miles long. Involving the chain of lakes it is 1,200 miles long up to the Gulf.

E 28. Quebec. The location where this city is situated was discovered by Jacques Cartier in 1535 and founded by Champlain in 1608. Throughout the Canadian Dominion one of the principal sports of the country is that of ice skating on the frozen snow, in the long winter season. Capital of the Province of Quebec. Population, 1901, 68,840.

E 29. Nova Scotia. A small province belonging to the British Possessions, 280 miles long and from 50 to 100 miles in width. Contains about 400 lakes and a population of 450,572. Capital city, Halifax.

E 30. Gulf of St. Lawrence. Lies westward of Newfoundland, and is the entrance to the St. Lawrence river.

E 31. Newfoundland. An island and province of the British Possessions at the eastern extremity of the North American continent, is 370 miles in length, 250 in breadth.

F 1. San Francisco. Population, 1900, 312,782.

F 2. Sierra Nevada Mountains. Extending 450 miles in length along the eastern boundary of California.

F 3. San Diego. Seaport city and port of entry, having a superior harbor, in lower California. Modern discovery by Captain Balboa in 1542. First settled in 1769. A new town commenced in 1867. Has many attractions both as a summer and winter resort. Will become a large city. Population in 1900, 17,700.

F 4. Salton Lake. A newly formed lake in southern California.

F 5. Colorado River. Rises in southeastern Utah, flows first west and then south 2,000 miles, emptying into the Gulf of California.

F 6. Boundary Line of Mexico. Extending from the Pacific Ocean to the Gulf of Mexico, a distance of about 1,400 miles.

F 7. Rocky Mountains. Extending from Mexico to the Arctic Ocean, a distance of 2,500 miles, being over 1,000 miles wide in the U. S.

F 8. Denver. Population, 1900, 133,850.

F 9. Santa Fe. Capital of New Mexico. An old Spanish-Mexican town, founded in 1605.

F 10. Indian Territory. A region having about 10,000 square miles, originally set apart by the government in 1848 for the use of the Indians.

F 11. Arkansas River. Excepting the Missouri, the largest branch of the Mississippi. Rises in the Rocky Mountains and flows 2,170 miles, southward, to the Mississippi, being navigable for eight months of the year for a distance of 800 miles from its mouth.

F 12. Red River. Rises on the east border of New Mexico.

F 13. Mississippi River. The principal river of North America, and including its chief branch, the Missouri, the longest in the world. Rises in the highlands of Minnesota and flows southward 2,600 miles.

F 14. St. Louis. Population, 1900, 675,239.

Notable Localities and Objects in Southern North America

F 15. Ohio River. Formed by the union of the Allegheny and Monongahela at Pittsburgh, Pa.; thence flows southwest to the Mississippi 950 miles. Navigable through its entire length.

F 16. Cincinnati. Population, 1,900, 325,902.

F 17. Allegheny Mountains. Extending from Cape Gaspe on the Gulf of St. Lawrence, southwest to Alabama, 1,300 miles. Are the dividing ridge between the Atlantic and the Mississippi valley.

F 18. Charleston. Population, 1900, 55,000. Since the early settlement of the States this has been a region celebrated for the growth of cotton.

F 19. Cape Hatteras. A dangerous point for ships on the sea, at the extreme eastern point of North Carolina.

F 20. Washington. Population, 1900, 278,718.

F 21. Philadelphia. Population, 1900, 1,293,697.

F 22. Bermuda Islands. So named because first discovered by Bermudez, a Spaniard, in 1527. Were colonized in 1609. There are 600 islets, which, in all, contain about 12,000 acres, the whole occupying about 20 miles in length by 6 miles in breadth.

F 23. Atlantic Ocean. That ocean, at the eastward of America, which divides the old world from the new, extending from the Arctic circle on the north to the Antarctic circle on the south, is 5,000 miles wide at the widest and 1,000 miles in width at the narrowest point.

G 1. Pacific Ocean. That great body of water at the westward of America, being about 9,000 miles long by 10,300 miles broad, at its greatest breadth, its area covering about two-fifths of the entire globe.

G 2. Guadalupe Island. Three hundred miles to the westward of lower California.

G 3. Tropic of Cancer. That line which is supposed to be the northern boundary of the equatorial region.

G 4. Lower California. That portion of California which is principally in Mexican territory; a very dry, rocky and forbidding region having a population numbering about 12,000 persons, the most of whom live near the southern extremity of the peninsula.

G 5. Gulf of California. Divides lower California from the rest of Mexico. Is 700 miles long and from 40 to 100 miles wide.

G 6. Mexico. Occupies the southern part of the North American continent occupied by a race of Indians about the seventh century called the Toltecs; subsequently, in the twelfth century, by the Aztecs, who remained here until the conquest of the country by Cortez, in 1519. Present population is 10,000,000 less than 14,000,000.

G 7. Sierra Madre. The name of the southern portion of the Rocky Mountains which are in Mexico.

G 8. Rio Grande River. Has a total length of about 1,800 miles, and for 100 miles forms the boundary between Mexico and the United States. Navigable for 450 miles from the sea.

G 9. Monterey, Mexico. The most thriving city of Northern Mexico, having, in 1900, a population of 62,200. Founded in 1596.

G 10. Gulf of Mexico. Basin of the Atlantic Ocean, covering an area of 800,000 square miles.

G 11. Galveston. Population, 1900, 37,780.

G 12. New Orleans. Population, 1900, 287,104.

G 13. Florida. The most southern portion of the United States, 400 miles long; average width, 120 miles. A very genial and favorite resort, in the winter season, because of its mild climate.

G 14. St. Augustine. The oldest city in the United States. The region hereabouts first made known to Europeans by Ponce de Leon, who landed near the city in 1512. The city itself founded in 1565. A favorite resort for people from the north in the winter season. Widely known because of its magnificent Ponce de Leon hotel.

G 15. Havana. The capital of Cuba and the most important city in the West Indies. Founded by Velasquez in 1511. Population of Havana and its suburbs, 1890, 235,981.

G 16. Cuba. Largest of West India Islands. Length, 750 miles; average width, 50 miles. Population about 1,200,000. The white people of Cuba are of Spanish descent and among the Indians are types of a very high order of beauty.

G 17. Watling Island. One of the Bahama, being the island on which, it is supposed, Columbus first landed, October 12, 1492, upon his arrival in the New World, 70 days after leaving Spain.

H 1. Mexico City. Capital of the Mexican Republic. Situated on an elevated plateau; is laid out with great regularity, being about three miles square. Supposed to have been founded by the Aztecs in 1327. Population, 1900, 368,777.

H 2. Volcano Popocatepetl. Largest volcano in Mexico, a mountain about 10 miles south-west of Mexico City. Is 17,700 feet above sea level. Though it emits smoke, no eruption has taken place since 1540.

H 3. Vera Cruz. Leading harbor on the eastern coast of Mexico, 200 miles from the Mexican capital; built in semicircle and surrounded by a strong wall. Population about 17,000.

H 4. Yucatan. A Mexican peninsula jutting into the Gulf of Mexico. Discovered by the Spaniards in 1517.

H 5. Guatemala. In Central America Area 48,200 square miles, nearly as large as Ohio. Has a population of 1,812,000. Many Northmen have recently come here and engaged in the cultivation of coffee and bananas.

H 6. Honduras. A Republic in Central America about the size of Indiana having a population of 744,901. Was discovered by Columbus on his fourth voyage, in 1502. Its boundary with the United States. Area, 42,678 square miles.

H 7. Nicaragua. A Republic of Central America, near the size of the State of New York. Population about 500,000. Has several smoking volcanoes, and a soil that produces, in abundance, all the fruits and vegetables of the tropics. Area, 49,200 square miles.

H 8. Lake Nicaragua. A sheet of water 110 miles long and from 30 to 50 miles wide.

H 9. Caribbean Sea. That part of the Atlantic Ocean, between the coasts of Central and South America and the large islands of the West India.

H 10. Jamaica. One of the West India Islands belonging to England, a little less in size than New Jersey. Length, 135 miles. 21 to 40 miles wide. Population, 581,000.

H 11. Haiti. Largest of the West India Islands. Cuba excepted; 400 miles long, 150 miles wide at the widest point. Is near the size of New Hampshire. Population about 1,425,000, nearly all negroes.

I-1. Isthmus of Panama. Narrow neck of land, connecting North and South America, a high range of mountains forming the barrier between the Atlantic and Pacific Oceans, which, at this point, are about 31 miles apart.

I-1. Panama Canal. The route for this canal was first surveyed in 1527. Panama railroad built in 1850-1855. Panama Canal Company organized by De Lesseps, 1879; work on canal begun 1881; canal company failed, 1888; De Lesseps and others sentenced to prison for fraud 1893; new French canal company formed, 1894; De Lesseps died, 1894; canal property offered to the United States, 1902 for \$40,000,000, accepted, 1903; a canal treaty made with Colombia, January 1903, was rejected by Colombia in August 1903. Revolution, organized the Republic of Panama in November, 1903. United States treaty with Panama for purchase of territory 550 miles in width on which site of canal November, 1903.

I-2. Aspinwall. Sometimes called Colon, is built on the coast of Colombia. Was founded by the Panama Railway Company, in 1850 and derives its name from W. H. Aspinwall, one of the principal railway shareholders.

I-3. United States of Colombia. The name for several confederated States, in this portion of South America, the area of which is 502,000 square miles, about seven times as large as the six New England States.

I-4. Venezuela. A portion of North South America. It is a confederated separate States and Republics, and contains a population of 2,108,225. Republican government.

I-5. Equator. The imaginary partition line midway between the North and South Poles dividing the north and south hemispheres, is marked by a line of celestial equator which being directly perpendicular to the axis of the earth.

"BACK TO THE LAND"



"Back to the land is the cry today, back to the dear old farm.
To the fields and the brook and the winding lane; back to their sylvan charm.
Back to the little attic room, which in boyhood days you knew,
When the raindrops pattered upon the roof, and sometimes pattered through."

AGRICULTURE

The Development of Agricultural Industry Since the Days of Abraham and Moses on the Banks of the Nile in Egypt

In order to supply the human family with food the art of planting and stirring the soil for production of food came into existence, along with the invention of numerous implements of husbandry designed to aid in the cultivation and production of various grains, vegetables, and fruits.

Gradually, through long ages the change from the state of nature, in which the human family must have lived, has been evolved.

The early account of agriculture relates to the countries bordering on the Mediterranean Sea. Here the different soils watered by the Euphrates, the Tigris, and the Nile taught the inhabitants the difference in fertility, the valley lands being rich in vegetable production while the hilly countries were better adapted to grazing.

The enrichment of land from overflow once a year on the eight-mile strip of land which borders the River Nile laid the foundation for much of the wealth of Egypt.

The annual several-weeks overflow extending into the months of August, September, and October, taught the Egyptians the value of fertilization through the manurial deposits left on the land.

From Egypt a knowledge of agriculture extended into Greece, where it flourished a thousand years before Christ. Here the art was carried to a high degree of perfection.

The Greeks had fine breeds of cattle, horses, sheep, and swine and importations were made from foreign countries for the purpose of improving the stock.

The use and value of manures were well known to the Greeks, and the importance of thorough tillage was well understood.

From Greece a superior agriculture extended into Rome, where a century previous to the Christian Era they had an agricultural literature, which surpassed that of any other country on the globe at that time.

But gradually through wars and as a result of the country being overrun by races who knew little of scientific cultivation of the soil, agriculture in the Roman Empire declined, but not until the Romans had carried their knowledge of agriculture to the Britons, where it has flourished, with varying success, up to the present time.

The first English treatise on husbandry, published in 1534. This work was entitled "The Book of Husbandry," and contains directions for draining, clearing and enclosing a farm; for enriching the soil and rendering it

fit for tillage, lime, marl, and fallowing being highly recommended.

During Queen Elizabeth's reign appeared Tusser's "Five Hundred Points of Good Husbandry," published in 1580. This work contained a great deal of useful information.

About 1645 the field cultivation of red clover was introduced into England, the interest taken in that grass, we may suppose, being similar to that experienced at the present time on the subject of alfalfa in the United States.

The Dutch having devoted much attention to the improvement of winter roots, and also to the cultivation of clover and other artificial grasses, the farmers and landed proprietors of England soon saw the advantages to be derived from their introduction.

Potatoes were introduced during the latter part of the sixteenth century, but were slow in coming into general cultivation.

Robert Bakewell and others effected some important improvements, in the eighteenth century, in the breeds of cattle, sheep, and swine. By the end of the century it was a common practice to alternate green crops with grain crops, instead of exhausting the land with a number of successive crops of any one kind of grain.

The wars caused by the French Revolution, 1795-1814, called so many men from the fields and so lessened production as to cause a great increase in price of farm products. This resulted in an extraordinary improvement in methods of agriculture.

In like manner the great increase in price of food products in North America, at the present time, will so stimulate improvement in cultivation of the soil as will result in great advance in agriculture throughout this country in the near future.

While agricultural art is well advanced in Europe the conditions are particularly very favorable in the Dominion.

The vast territory here presents every variety of soil and climate. Its agriculture embraces practically all the products of European cultivation.

This country exceeds all other nations in wonderful adaptation of machinery for all purposes of cultivation and harvesting of crops.

The disposition of the American to experiment, to test alleged improvements, to adopt labor saving devices and expedients, gives a

Improvement Being Made by Agricultural Societies

great impulse to the genius of inventors. This mental activity of the local farmers is owing, in great measure, to his superior intelligence.

The American reaper was invented by McCormick in 1834; by many improvements it has secured the European as well as the home market. In 1855 the first American Agricultural College was established. Now nearly every Province is represented by several well-equipped colleges or universities where agriculture is taught.

The dairy system based on the principle of association has advanced rapidly. Agricultural societies, both Province and county, are established for the following objects:

To encourage the introduction of improvements in agriculture.

To secure improved agricultural implements and farm buildings.

To foster the application of chemical knowledge to agriculture.

To forward the destruction of insects injurious to vegetation.

To promote the discovery and adaptation of new varieties of grain or vegetables.

To collect information regarding the management of timber lands and plantations.

To improve the education of those supported by the cultivation of the soil.

To advance the veterinary arts and science.

To improve the breeds of all the domestic animals.

Fairs are held at which prizes are distributed for live stock, implements, and farm produce.

Through efforts of the above-mentioned societies, the investigations of scientific men, and the general diffusion of knowledge among all classes, by means of several hundred periodicals devoted to its interests, agriculture has made great progress during the past century.

Among the improvements we may mention deep plowing and thorough drainage; with the introduction of new and improved agricultural implements, by which heavy farm labor has been greatly diminished.

Science also has been called in to act as the handmaid of agricultural art, and, aided by the chemist and the entomologist, agriculture has been put on a really scientific basis.

The organization of plants, the primary elements of which they are composed, the food on which they live and thrive, and the constituents of soils, have all been investigated and most important results obtained, particularly in regard to manures and rotation of crops.

Artificial manures in great variety to supply the elements needed for plant growth have come into common use, not only increasing the produce of land previously cultivated, but extending the limits of cultivation itself.

An improvement in all kinds of stock is becoming more and more general, feeding of domestic animals is conducted on more scientific principles, and improved varieties of plants used in field crops have been introduced. As a result of the new conditions, to be a thoroughly trained and competent agriculturist, requires a special education, partly theoretical and partly practical.

In particular, no scientific cultivator can now be ignorant of agricultural chemistry, which teaches the constituents of the various plants grown as crops, their relation to the several soils and the nature and function of different manures.

Nearly all the Provinces have colleges or departments of colleges devoted to the teaching of agriculture and large allotments of public land have been made for their support.

In the United States the Department of Agriculture was organized in 1862, the secretary of which is now a cabinet officer. Through the enterprise and efforts of this department of the government, experiment is constantly going forward at the different experiment stations, the results of which are published in bulletins by the government and sent broadcast throughout the country.

At this writing the government, aided by public-spirited agriculturists, is putting forth special effort in the introduction of a new grass plant known as alfalfa, the merit, growth and cultivation of which we explain elsewhere. Other plants and improved features of agricultural industry will be developed from time to time.

It is impossible to forecast the great future of agriculture in the Dominion. To partially imagine it we need only go back in memory a short time to the period of the ox-cart, now supplanted by electricity; to the short time ago when the land, now yielding forty and fifty bushels of grain to the acre, gave us only eight and ten bushels.

Today the farmer is just beginning to realize some of the profits of his vocation. Many of his fowls each give 200 eggs a year; he is making use of the reaper, the milking machine, the riding-cultivator, and the auto that goes to the market town to deliver in an hour the same bulk which would have formerly consumed the time of the farmer one whole day to transport.

As we have advanced in the past, so will agricultural art progress in the future. This great advancement will largely come from the thousands of students now in the agricultural colleges, from the pupils that have graduated from the schools in domestic science, and from the knowledge that will be disseminated through the wonderful multiplicity of agricultural instruction that will come from handbooks distributed in the schools.

A GUIDE TO LAND

How to Use the Soil for Pleasure and Profit.

Ever since the days "when Adam delved and Eve span," the soil has furnished man's greatest and most natural means of livelihood. In fact, a man is never more of a man than when engaged in garnering a living from the bountiful bosom of Mother Earth.

The importance of the soil as a natural resource, and the pleasure and profit to be derived from land culture, are recognized today as never before in the history of the race. Congestion of population in urban centers, resulting in unemployment, poverty, disease, distress, squalor and crime, has turned the eyes of thousands of city residents to the opportunities afforded on every hand to gain health, happiness and financial freedom, by intelligent use of available land.

But the stumbling-block in the way of the city or suburban resident hitherto has been the question, how to set about it? How to realize the natural desire to get "back to the land"? How to utilize the garden space, the vacant lot, the suburban acre, or the possible truck farm or quarter section, so as to make them yield the profit that other men and women have wrested from their land, with bettered health and untold pleasure? The city man has hesitated to turn to the land for a living because of lack of exact knowledge how to make it pay. Now he need hesitate no longer, for in this book will be found in plenty just the kind of information and advice he requires, based upon the results of actual experience on the land and having all the weight and advantage of expert authority.

This is the first and only book to give this information to the land-hungry and the seeker after economic freedom. The slightest inspection will suffice to show that the book is replete with the most valuable features. Its "Guide to the Land" is the most comprehensive ever published, and the most useful to those seeking a locality for settlement, because it shows the characteristics of all available localities, including conditions of climate, soil and transportation, the kinds of crops that may be raised, and all the possibilities for profit that exist in the soil. Besides all this, a vast amount of useful information of a general character respecting each locality, is given in the Guide.

The Guide, however, important as it is, forms only one of the many features of this book that will appeal to the man or woman who feels the irresistible call "back to the land." It may not be necessary to look for a new location—and in that case this book will tell you what you can do with the land

A Guide to Land—Continued

you have, though it be but the backyard of a city lot. It is packed full of the most practical kind of information on all subjects of interest to those who would know the joy and gain the benefit of raising the things that spring from the soil and the creatures that thrive upon them.

The best methods of agriculture, of horticulture, of stock-breeding, of dairying, of raising poultry for profit, of market gardening, fruit culture, bee-keeping, and a host of other profitable pursuits upon the land, are here described in full. The language of the book is that of the practical man, easily understandable and plain in direction and advice; but the information given is based upon exact science, upon knowledge gained by experience. It is akin to the information that would be gained by attendance at one of the great agricultural colleges, those splendid institutions that have done so much of late years to increase the efficiency of American agriculture and the comfort of rural homes; and that are yearly sending out their thousands of young men and women equipped with scientific ability to make two ears of corn grow where only one grew before, or to make the home of the ruralite healthier, happier and more prosperous by approved methods of domestic science. To those who cannot attend a school of agriculture, this book will bring, in a form for ready reference, many of the benefits of a technical training for living off the soil.

The business of farming is today at the flood-tide of prosperity. Every product of the soil is in great demand and the rewards of the agriculturist far exceed all previous records. No wonder then that the thoughts of hundreds of thousands of men in all walks of life are turned toward the business in which, more than in any other, the individual is his own master, the arbiter of his own destiny.

Nature stands ready to enter into partnership with any man who will undertake soil-cultivation in earnest, and will help him to success. And this book will show him how to start right in the oldest, greatest and most lucrative business the world has ever known. It is a book for everybody, since everybody is interested in the land; a book for the business man, the parent and the teacher; for the dweller in the city and the tiller of the soil. From its pages the young may learn, or may be taught, how the wonderful products of Nature are made available for man's use, and every seeker after independence and comfort may learn how to secure them from the soil.

An Expert's Advice on the Fertilization of Land

HOW TO RESTORE FERTILITY TO WORN-OUT SOILS

The Restoration of Fertility to Worn-out Land Being a Matter of Importance to All Tillers of Soil, We Publish the Following Information for Land Cultivators,

Issued by the U. S. Bureau of Agriculture at Washington.

These Directions About Land Culture Come
In a Pamphlet Entitled

RENOVATION OF WORN-OUT LAND

By W. J. Spillman,

Agriculturist in charge of Farm Management Investigations, Bureau of Plant Industry Assisted by
Dr. J. A. Bonstedt of Bureau of Soils Industry.

A summary of subjects treated includes: Differences in Natural Fertility—Nature of the Soil—Mineral Plant Food—Nitrogen Compounds—Soil Moisture and Humus—Soil Air—Substances Thrown Off in the Soil by Growing Plants—Effects of Tillage—Effect of Plowing Soil When Too Wet or Too Dry

—Terracing and Soil Washing—Improving the Soil—Increasing the Stock of Humus—Stable Manure—Green Manures—Crimson Clover—Vetches—Rye—Composts—Miscellaneous Green Manure Crops—Types of Farming That Build Up the Soil Quickly.

PRELIMINARY REMARKS

For nearly two centuries after the advent of the white man in America farming was confined to a narrow strip of land adjacent to the Atlantic; the population was sparse, and when a field became worn out the near-by woodland was cleared. As population increased, the younger generation crossed the Alleghenies, beginning the tide of migration which has moved westward until the present time, but which has now occupied nearly all of the available lands from the Alleghenies to the Pacific. In its westward course this advancing host furnished virgin soils for a century. The marvelous development which has occurred in this country during the past century was made possible by the abundant fertility of the new lands brought under cultivation and the consequent abundance and cheapness of farm products.

So long as plenty of fertile land remained unoccupied in the West the exhaustion of the older land in the East was a matter of concern only to the farmers of the older settled communities. But now we are confronted by the necessity of tilling soils whose ability to produce satisfactory crops has been greatly impaired. There is even a perceptible flow of immigration from the high-price lands of the Middle West to the depleted lands of the Atlantic seaboard. This has been made possible by the recent remarkable development of agricultural science, which has demonstrated the feasibility of restoring fertility to exhausted soils. Agricultural science is also responsible for the present movement from the city to the country. The conditions of country life have been alleviated; the farm has been made attractive by adding the zest of intellectual occupation in the splendid agricultural literature of the day and farming, when intelligently followed, has been made profitable, even on lands that were formerly unproductive.

DIFFERENCES IN NATURAL FERTILITY.

There is a vast difference in the natural fertility of soils. Some do not produce well from the start unless special attention is given to making them productive, others produce large crops for a short time and then rapidly diminish in fertility; while others, known as strong soils, remain productive for many years without attention to their fertility. But even the strongest soils will wear out in time unless they are intelligently managed. Curiously enough, as the tide of migration went westward in this country, the settlers found soils of increasing natural fertility as they went, and in each new settlement the opinion prevailed that the soil was inexhaustible. But even the strong soils of the western prairies have now been cropped with grain and abused by improper methods of tillage until they show signs of approaching exhaustion.

Fortunately, while the rich soils of the West were being depleted of their fertility the development of agricultural science was going forward with rapid strides, and, while there is much yet to learn about the soil, we now know, in a general way, the steps necessary to build up and maintain soil fertility. In fact, soils that were originally only moderately productive, and that have been rendered almost sterile by improper methods of farming, can be made richer than they ever were.

NATURE OF THE SOIL.

In order to understand the methods necessary for restoring worn-out soils, let us consider what occurs in a fertile soil that is growing a large crop. Imagine a cubic inch of ordinary field soil magnified into a cubic mile. It would then present very much the appearance of a mass of rocks varying from the size of a pea to masses several feet in diameter. Scattered among these rock masses would be many pieces resembling plant roots and other organic matter, gravel. The masses of organic matter would be found to contain large quantities of water, and to somewhat resemble wet sponges, while every mass of rock would have a layer of water covering its surface. The open spaces between the solid masses would be filled with air.

If a crop were growing on this soil, its roots would be found threading their way among the masses of rock and decaying roots, and pushing these aside by the pressure exerted by the growing roots. From the surface of the growing root, near its tip, small hollow threads (the root hairs) extend into the open spaces and suck up the water covering the rock particles. The root hairs are not open at the end, they absorb the water through their walls. The plant food is dissolved in this water, but is usually present in exceedingly small quantities. While the plant is growing a constant stream of water flows up through it and evaporates at its leaves. For every pound of growth in dry matter made by the plant, from 300 to 500 pounds of water flow up through it.

The plant food substances dissolved in the soil water may be divided into two classes, according to their ultimate source.

MINERAL PLANT FOOD.

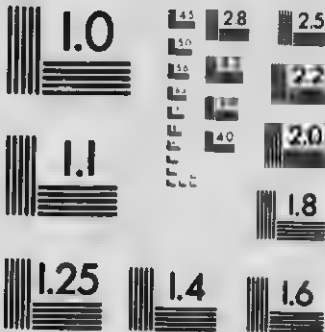
Plants in their growth make use of thirteen chemical elements, nine of which they secure directly from the soil. These are called the mineral plant foods; they are phosphorus, potassium, calcium, magnesium, sodium, iron, silicon, chlorine and sulphur. We have already seen that the soil consists mainly of small particles of rock. The rock particles are of many kinds, but nearly all kinds contain more or less potassium, calcium, phosphoric acid, etc. Every year the soil water dissolves off a thin surface layer from each particle. Plants appropriate this water and thus secure mineral plant food.

Many generations of plants have thus been collecting their small toll of food from the soil and storing it up in their tissues. The amount of plant food made ready for plant use during each growing season through the slow solution of the mineral particles of the soil is doubtless supplemented to a considerable degree by the same kinds of material as that in the organic matter also found in the soil. The dissolved minerals, but built into plants during some former season, may again be used by other plants when the old matter is given an opportunity to decay in the soil. These foods derived directly from the mineral matter of the soil and indirectly from former crops, are also supplemented in many cases by the application of mineral matter in the form of commercial fertilizers.



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Effects of Moisture, Air and Cultivation

BEST KINDS OF MANURE IN RENOVATING SOIL

Growing Crops to Plow Under

NITROGEN COMPOUNDS.

In addition to the nine elements already mentioned, the growing plant requires four other elements, as follows: Hydrogen, which it secures from water (water is a compound of hydrogen and oxygen); oxygen, which it secures partly from water and partly from the air; carbon, which is secured from carbonic-acid gas in the air, and nitrogen.

Nitrogen is in many respects the most important of all the plant-food elements. It is not found in appreciable quantities in the rock particles of the soil. Ordinarily plants depend for their nitrogen entirely on decaying organic matter. As decay proceeds nitrates are formed from the nitrogen contained in organic matter. The nitrates are exceedingly soluble, and unless soon made use of by growing crops they are washed out of the soil. Nitrogen is therefore usually the first element to become exhausted in the soil.

Fortunately, there are certain species of bacteria that can use atmospheric nitrogen of which there is an inexhaustible supply. One family of plants—the legumes—has learned to exchange work with these bacteria, and these plants are thus easily supplied with an abundance of nitrogen in a form they can use. When these nitrogen-fixing bacteria are present in a soil on which a leguminous crop is growing, the bacteria invade the roots of the legume and live there. Their presence is usually made manifest by swellings—the so-called tubercles—on the roots of thrifty plants of clover, alfalfa, beans, peas, and other legumes. Nitrogen from the soil air filters into the roots, where the bacteria appropriate it, manufacture an abundance of nitrates, and give a portion to the plant in exchange for starch. The tissues of leguminous plants become very rich in nitrogenous compounds, and when they decay in the soil they set free large amounts of nitrates for the use of any crop which may be growing at the time.

The cultivation of leguminous crops is one of the most important and economical means of maintaining a supply of nitrogenous plant food in the soil. Nitrates may, of course, be supplied in commercial fertilizers; but fertilizers containing nitrogen are very expensive, and it usually pays better to supply nitrogen by growing legumes or by the application of stable manure, which is rich in nitrogen when properly handled. In good farm practice both stable manure and leguminous crops are used as sources of nitrogen.

SOIL MOISTURE AND HUMUS.

In order to produce a ton of dry hay on an acre of land it is necessary that the growing grass pump up from that acre approximately 500 tons of water. In order to supply this enormous quantity of water, the soil must not only be in condition to absorb and hold water well, but it must be porous enough to permit water to flow freely from soil grain to soil grain. The presence of large quantities of decaying organic matter (humus) adds enormously to the water-holding capacity of the soil. One ton of humus will absorb 2 tons of water and give it up readily to growing crops. Not only that, but the shrinkage of the particles of decaying organic matter and the consequent loosening of soil grains keep the soil open and porous.

Furthermore, humus of good quality is exceedingly rich in both nitrogen and mineral plant food. The maintenance of fertility may almost be said to consist in keeping the soil well supplied with humus. The first step in renovating worn-out soils is to give them an abundant supply of humus of good quality. Perhaps the best source of humus is stable manure containing both the liquid and the solid excrement, especially when the stock are fed rich nitrogenous foods. Even a poor quality of barnyard manure, which has had much of the plant food leached out of it, has considerable value because of the humus it makes.

Another cheap and valuable source of humus, but one which must be used understandingly, is crops grown to turn under as manure. The legumes are especially valuable for this purpose because of the nitrogen they contain, but other crops, such as rye, and even corn sown thick, may sometimes be made to supply large quantities of humus of fair quality. Crops thus used are called green manures. They are more fully discussed farther on.

SOIL AIR.

A proper circulation of air in the soil is just as important as any other factor of plant growth. Nearly half of the volume of ordinary soils is occupied by air spaces. The air spaces in the soil wind in and out between the soil particles, just as they do in a pile of larger stones. If the layer of water on the surface of the soil grains becomes so thick as to stop the air passages here and there the soil is then too wet for most crops and needs drainage. Plants have no special breathing organs, the oxygen required in their breathing finding entrance all over the surface of the plant. Plant roots must therefore be supplied with air, and hence the soil must be porous enough to permit of free circulation of air. A good supply of humus and proper tillage will accomplish this result in clay soils. Sandy soils are usually too porous, needing humus to help them retain water.

Another reason why air must circulate freely in the soil is that large quantities of oxygen are required to insure proper decay of organic matter to supply plant food. Also, carbonic-acid gas is produced by the decay of organic matter, and this must escape easily to make room for the atmospheric oxygen needed in the soil. The movement of air in the soil is frequently shown by the bubbles which appear at the surface of the soil just after a hard rain. As the water soaks into the soil it drives the air out, and bubbles may be seen at the surface if water enough is present to form them.

One of the most important objects of plowing is to loosen up the soil and mix fresh air with it.

SUBSTANCES THROWN OFF IN THE SOIL BY GROWING PLANTS.

Considerable evidence has been accumulated during recent years to show that the cause of the failure of some soils to produce satisfactory crops may be ascribed to unfavorable conditions produced in the soils by the plants themselves. It is thought that during the growth of the plant certain unknown organic substances are given off which, when they accumulate in the soil to any extent, are harmful to the further growth of plants of the kind that produced them. It is possible that some of the benefits known to arise from systematic crop rotation may be explained on this basis. These harmful substances seem to be disposed of rapidly by certain soils, usually those in which organic matter is readily converted into humus. Other soils, usually marked by a lack of the brown carbonized organic matter, do not seem to possess this property of removing harmful plant products to such a degree. This idea is in accord with the common experience that dark-colored soils, well filled with organic matter, are usually very productive.

In connection with the study of these poisonous organic products, it has been found that they may be destroyed or at least rendered harmless in a variety of ways. Barnyard manure or decaying organic matter, such as a green crop of rye or cowpeas, turned under has a very marked effect in freeing the soil from them. Almost all of the common commercial fertilizing materials act more or less in the same way. Commercial fertilizers for soil improvement have, therefore, another value besides adding plant food. Thorough and complete airing of the soil will often destroy or overcome these poisonous substances. The beneficial effects of plowing and of thorough surface tillage are thus explained, in part at least, on the basis of the thorough aeration secured. When the same crop is not grown oftener than every three or four years on the same land the injurious substances a crop throws off seem to have time to disappear before the same crop is grown again; hence the benefit from crop rotation. When the soil is well supplied with humus there is seldom any trouble from this source, and the same crop may be grown year after year with good yields, though continuous cultivation of the same crop may invite injury from certain insects and fungous diseases which live over in the soil or in the remains of the crop.

EFFECTS OF TILLAGE.

Improper methods of tillage add very greatly to the evil effects that result from lack of humus. In many parts of the country the land is plowed only

Treatment of New Land When First Broken

PLOWING—WHEN TO PLOW—DEPTH TO PLOW

Effect of Plowing When Soil Is Too Wet

3 or 4 inches deep. Below the plowed stratum the soil becomes sour, densely packed, and unfit for plant roots. When such soils are plowed deep and this sour packed subsoil is mixed with the upper portion, the growth of many crops is greatly retarded. This has led many farmers to believe that deep plowing is ruinous. Some farmers have tried to remedy the difficulty by subsoiling. The subsoil plow breaks up the packed layer but does not throw it out on top. But while subsoiling does break up the hard layer into chunks it does not pulverize it or put humus into it. In most cases work done in subsoiling is practically wasted, and it is doubtful if it ever pays. A much better method is to plow a little deeper each year until a depth of 8 or 10 inches is reached. This gives a deep layer of good soil, particularly if the supply of humus is kept up.

When new soil, or that which has lain undisturbed for several years, is broken up, it is always best to plow deep from the beginning, for the deeper layers will be about as fertile as any, except the top inch or two. It is wise, too, never to plow the same depth twice in succession. In general, fall plowing should be from 7 to 9 or 10 inches and spring plowing from 5 to 7 inches deep. There are special cases in which these rules do not apply, but their discussion would take us too far from the purpose of this paper.

We plow the soil in order to loosen up its texture and get air into it; also to turn under stubble, manure, etc., to make humus. Killing weeds is another object accomplished by plowing. After a soil has been thoroughly pulverized to great depths, so that there is no danger of turning up packed clay, the deeper the plowing the better the crops. But the cost also increases with depth, so that ordinarily it does not pay to plow more than about 10 inches deep.

Some crops prefer rather a loose seed bed. Millet is such a crop. Farmers sometimes plow a second time in order to sow millet on freshly plowed land. Other crops, such as wheat and alfalfa, prefer a fairly compact seed bed; hence, frequent harrowing and rolling after plowing is good practice before seeding to these crops. Nevertheless, it pays to plow the land for them, even if we have to compact it again before seeding. The plowing aerates the soil and helps to set plant food free.

EFFECT OF PLOWING SOIL WHEN TOO WET OR TOO DRY.

Sandy soils are usually not injured by handling when wet; but the case is different with clay soils. A fair quality of brick can be made from any heavy clay soil by working it thoroughly when wet and then drying it in the sun. The effect produced by working clay soils wet is known as puddling. Irrigation ditches in the West are puddled by first flooding them to make them muddy and then driving bands of sheep along in this mud. This makes the bottom impervious to water and prevents loss from leakage. If a clay soil is plowed, or even harrowed when too wet it is more or less puddled. In this condition it becomes cloddy and impervious to air and water. Old roadways that have been thoroughly puddled from traffic in all kinds of weather may be distinguished in fields many years after they have been plowed up and put into cultivation.

The proper time to plow land is when it is just moist enough to break up mellow, neither wet enough to leave a slick surface where rubbed by the moldboard nor dry enough to break up in large clods; or, as the southern farmer puts it, when the soil has a good season in it. If continued rain follows wet plowing, little harm follows; but hot, dry winds would soon leave only a mass of unmanageable clods. In spring and midsummer plowing, particularly, it is of the utmost importance to run the harrow immediately after the plow. This prevents the formation of clods. In late fall plowing, the clods are no disadvantage, for they will be broken up by freezing and thawing during the winter.

TERRACING AND SOIL WASHING.

One of the most serious results that follow shallow plowing, at least in hilly regions, is the washing away of the soil in torrential rains. In some sections particularly in the southern portion of the Appalachian Mountain region, farmers have attempted to

counteract this by means of terraces. Much of the farm land in the Carolinas, Georgia, and Alabama is nothing but a series of stair steps. When terraces are properly laid out they do prevent washing, but they are a very expensive means of accomplishing the end sought. They occupy land that ought to be in crops. They seed the land with weeds. When improperly constructed, and they usually are, they cause great ditches to be washed in the hillside. Besides this they cut the land up into small, irregular patches and greatly increase the cost of tillage. There is a better way of preventing washing in nearly all cases.

In the first place, where land has been plowed only 3 or 4 inches deep for several years the subsoil becomes impervious to water and can not absorb a heavy rainfall fast enough to prevent its flowing over the surface. But when the land is plowed gradually deeper until a good depth of loose soil is obtained and particularly when an abundance of humus is supplied from grass roots and stubble, or from green crops turned under, or better still, from barnyard manure, the soil becomes so porous that the heaviest rains cause little or no flowing of water on the surface. Striking illustrations of this fact are to be found on the farm of Mr. W. L. Williamson, of Jackson County, Ga., and on the farm of Rev. J. D. Detrich, described in the Yearbook of the Department of Agriculture for 1903 under the title "A Model Farm." In the Yearbook paper referred to, illustrations are shown of two fields lying side by side, both in rye. The pictures were taken within a few feet of each other. In one two large ditches had just been filled with dirt. In the other there was no tendency to wash. Mr. Williamson's farm is located in a region where terracing is very general. Since he abandoned cotton culture and began dairying he has plowed up all his terraces, and his land does not wash. He plows deep and manures heavily. But it is possible to accomplish similar results, even on a farm largely devoted to cotton, by deep plowing and the use of green manures to supply humus.

IMPROVING THE SOIL.

We have seen that poverty in soil may be due to poor texture, unfavorable structure, lack of humus, deficiencies in the amount, form, or proportion of plant food, and to the presence of harmful mineral and organic compounds. With the exception of nitrogen, most soils, even those that are very poor, usually contain an abundant supply of plant food, though sometimes other elements are lacking or are present only in those forms that plants can not use.

To increase fertility we must improve texture and add plant food and humus. Tillage may do much to improve texture, but tillage alone will not suffice. We must add humus. In doing so we add plant food, and make the soil more permeable to air and water.

INCREASING THE STOCK OF HUMUS.

There are three general methods of supplying humus to the soil. The first and best is the addition of stable manure. When properly managed it adds large quantities of both plant food and humus. But manure is not always available. When such is the case, the best thing to do is to make it available. Raise more forage, keep more stock, and make more manure. But this takes time and capital, so that other means are sometimes necessary. When stable manure is not to be had, we may plant crops for the purpose of turning them under, thus adding large quantities of humus at comparatively little cost. Plowing under green crops is called green manuring. Under certain conditions this is an excellent practice. Crops adapted to this purpose and the method of using them are discussed farther on (p. 12).

A third method of adding humus is to grow crops like clover and timothy. These crops are usually left down for two years or more. During this time their roots thoroughly penetrate the soil. Old roots decay and new ones grow. When the soil is plowed up, more or less vegetable matter is turned under. This, with the mass of roots in the soil, adds no small amount to the supply of humus. Another advantage from the cultivation of clovers and alfalfa is found in the fact that they are deep-rooted plants, and when their roots decay they leave channels deep

The Careful Saving of All Manures

HOW TO GET BEST RESULTS IN MANURING

The Waste of Manure On Farms

into the earth, thus aiding in the absorption of rains and letting in air to sweeten the soil.

STABLE MANURE.

Properly handled, stable manure is by all means the best remedy for poverty of the soil. Very few farmers handle manure so as to get even as much as half the possible value from it. There is probably no greater waste in the world than in connection with the handling of manure by the American farmer. Five-eighths of the plant food manure is found in the liquid part of it. This is usually all lost. Not only is this the case, but the solids are piled beside the barn, frequently under the eaves, where rains wash away much of their value. Fermentation in these manure piles also sets free much of the nitrogen to escape into the air.

The writer has seen few farmers who had no apologies to make for their methods of handling manure. He has seen one, however, who believed he was getting every particle of value from the manure it is possible to get. The farm in question was a dairy farm, and the methods used are not applicable to all types of farms. The cows were kept in their stalls the year around. Every day in the year they had either silage or green stuff from the fields. They also had enough dry hay to keep the manure from being too watery, and what grain they needed. Behind each row of eight cows was a ditch 18 inches wide and 8 to 10 inches deep. This ditch was cleaned thoroughly every morning after milking hours. After the cleaning, a small quantity of wood ashes was sprinkled in the ditch to dry it; then a layer about 1½ inches deep of rotten sod or leaf mold was added. Next morning the contents of the ditch were lifted into a cart by means of forks, and the cart went immediately to the field where the manure was scattered. In exceptionally bad weather the ditch was sometimes left for two days. This farmer always had a place to put manure.

This method may not be applicable to all dairy farms, but it is the ideal to be followed as closely as circumstances will permit. If there is no sod on which to haul manure in wet weather, it is well to have a cemented pit under cover, in which to place the manure until it can be hauled to the field. When the ground is frozen in winter, manure can be spread on almost any field. Generally speaking, it should be spread on the field next to be plowed. The above method of handling manure gets both liquids and solids on the land. If any leaching occurs, let it be into the soil where the leachings will do the most good. Recent investigations indicate that when liquid manure is applied to the soil, the plant food in the manure is absorbed and held in the soil, and is not immediately washed out if not made use of by the plants.

GREEN MANURES.

The practice of plowing under green crops as manures is not very general, and we do not know as much as we should like to know of the value of this method. Some crops do not thrive when sown on land into which a green crop has recently been plowed. This is particularly true of those crops that like a solid seed bed, or which are sensitive to acids. When a heavy green crop is plowed under, it goes through a fermentation not unlike that which occurs in a barrel of kraut, resulting in the formation of a considerable amount of acid.

Alfalfa is particularly sensitive to acids, and it also requires a compact seed bed. It is unwise, seedling to alfalfa. The cereals, particularly wheat and rye, do not do well after a green manure. On the other hand, potatoes and corn are not seriously injured by green manures. In fact potatoes are benefited by them, since the resulting acid condition of the soil prevents the development of potato scab.

Generally speaking, when it is desirable to plow in a green crop before fall-sown crops, it should be done a month or six weeks before planting time and the soil should be harrowed frequently or otherwise compacted. A few good rains will wash out most of the acids and aid in compacting the soil. The acid may also be counteracted by adding lime.

CRIMSON CLOVER.

Along the Atlantic coast as far north as New Jersey and south at least to Georgia, crimson clover, frequently called German clover, thrives as a winter annual. Like all the legumes it stores up much nitrogen and greatly enriches the soil in this element. This crop deserves a much wider field of usefulness than has yet been accorded it. In the northern part of its territory it should be sown in July. In the South, September is supposed to be the best time to sow it. It is best adapted to sowing in corn or cotton. In sections where it has not previously been grown it frequently fails, apparently from lack of its proper bacteria. It is therefore well to inoculate the seed when it is sown for the first time.

This crop furnishes valuable winter pasture, makes good hay if cut when just coming into full flower, and is valuable as a green feed in spring. It helps to fill the gap in the sowing system between green wheat and early corn. Perhaps its greatest usefulness is as a green manure. It may be plowed under any time in the spring and be followed by corn or potatoes.

In this connection, the practice of a farmer near Hagerstown Md., is of interest. Ten years ago he began sowing crimson clover in corn at the last plowing, covering the seed with the cultivator, and using 10 pounds of seed to the acre. In the spring the clover was plowed under and another crop of corn planted. Ten consecutive crops of corn have been taken from this field, a crop of crimson clover being plowed under each spring. The yield of corn has increased during that time from about 35 bushels, in the beginning, to about 60 bushels at the present time. Evidently the practice was a good one in this case.

Those who are not familiar with crimson clover should try it on a small scale at first, as there have been many failures with it. The following five-year rotation is a good one on stock farms in middle latitudes, and shows one way of securing the benefits of crimson clover as a green manure: Corn with crimson clover sown at last cultivation, corn, oats, wheat, clover (common red).

VETCHES.

The vetches can be made to occupy a somewhat similar place as a green manure, at least in the South. Prof. E. R. Lloyd, of the Mississippi Agricultural Experiment Station, reports an instance of a cotton grower who uses hairy vetch and cowpeas in a unique manner. At the beginning he sows hairy vetch broadcast in his cotton at the last plowing. The next spring the old cotton stalks were left standing, the new rows of cotton being planted in the middles, which were bedded up in the usual manner. When the vetch had made seed, the stalk cutter was run over the old rows and they were then plowed out and cowpeas planted in their place. Subsequent cultivation was between the cotton and the cowpea rows. In the autumn the vetch sprang up again and grew during the winter, the cowpeas being left to decay in place. The following spring the vetch was left to seed on the old stalks as before. This method requires that the cotton rows should be about 5 feet apart, but the farmer who practices it assured Professor Lloyd that his yield of cotton had doubled in the three years since the practice was started. This method is worth the attention of farmers who grow cotton continuously on the same land, and this class includes the vast majority of cotton growers.

RYE.

Rye is not half appreciated by the American farmer. It is very hardy, will grow on the poorest land, makes good winter and spring pasture, and if sown early enough makes good fall pasture. It is a good spring mowing crop, giving the earliest bite of green stuff. It makes a fair quality of hay if cut in bloom or before, and its straw always sells at good prices and makes the best of bedding for cattle and horses. It is also an excellent green manure crop.

How Frequently Rotate Crops

FERTILIZERS THAT BUILD UP SOIL MOST QUICKLY

Valuable Crops in Plowing to Turn Under

for turning under in early spring. While it does not add nitrogen as the clovers do it makes a great deal of humus, and thus improves the texture of worn out soils. It will grow in any section that can grow any of the small grains. Where corn or potatoes or cowpeas are grown after corn, rye may be sown in the corn at the time of "laying by," or may be sown on the stubble after the corn is cut, and be plowed under in the spring for any of the crops mentioned.

COWPEAS.

The cowpea has been a boon to the farmers of the South, and its value is coming to be generally recognized. During the past few years the demand for cowpea seed has exceeded the supply, and high prices have resulted. A good way to secure its beneficial effect of the soil is to sow it in corn at the last cultivation. This practice has become well-nigh universal in the South and is extending northward. This crop may also be sown after wheat, oats, or rye, at least from the latitude of Washington, D. C., southward, and may be harvested for hay in time for another fall crop to be sown. Prof. H. J. Waters, of the Missouri Agricultural Experiment Station, has grown cowpeas between wheat crops for several years past and increased the yield of wheat in a marked degree.

It seldom pays to turn under a crop of cowpeas in the green state. It is better practice to make hay of them, feed the hay, and put the manure back on the land. As is the case with all legumes, the roots of the cowpea crop add a great deal of nitrogen to the soil, and have a marked effect on fertility. If a heavy green crop of cowpeas is plowed under in the autumn it is best not to plant the land until the following spring. A very good plan for bringing up the fertility of a worn-out field is to sow rye in the fall, plow this under in the spring, harrow thoroughly, let the land lie a month, and then sow cowpeas. Cut the peas for hay and sow rye again. A few seasons of such treatment will restore fertility to the soil. Fortunately, both of these crops will grow on very poor land.

MISCELLANEOUS GREEN-MANURE CROPS.

Almost any crop may be used as a green manure, as occasion demands. Those previously mentioned are more generally used for this purpose than others. In plowing up clover sod, many farmers, particularly on fields most in need of manure, wait until the clover is nearly ready to cut for hay before plowing, in order to get the additional nitrogen and humus thus produced. Buckwheat is frequently grown as a green manure. This crop is planted in early summer or late spring and turned under in the autumn. Even corn and sorghum have been used for this purpose. They produce large amounts of humus when thickly planted. Sufficient time should be given after plowing in such rank growth to allow the soil to settle and the resulting acids to wash off the soil before planting another crop. In the South, the so-called "English pea" of the southern California, fenugreek and Canadian fl.

the South) are used extensively as winter cover crops in orchards. They are then plowed under in the spring as green manure.

TYPES OF FARMING THAT BUILD UP THE SOIL QUICKLY.

The quickest way to build up a worn-out soil when barnyard manure is not plentiful is to give it a course of treatment like that just described, then grow only forage crops, buy grain to feed with them, and return all the manure thus produced to the land. Dairy farming permits such a system to be practiced. No other type of farming builds up land so rapidly.

Another type that gives fairly quick results is to grow a succession of pasture crops for hogs, keep the hogs on these pastures, and feed them a fourth to a half ration of grain. In middle latitudes the following system is adapted to this type of farming. Grow corn enough for the pigs on part of the farm, sowing either cowpeas or crimson clover or rye in the corn yearly, to keep up fertility. The two latter crops furnish winter pasture for the pigs. On the remainder of the farm run the following three-year rotation: Sow oats in early spring, follow by rye sown early in August; follow this by sorghum the following spring; in September or October sow rye again after the sorghum; late the next spring sow either sorghum or cowpeas, and begin over again with oats the succeeding spring. This may be made a four-year rotation by inserting artichokes or sweet or Irish potatoes between the August-sown rye and the sorghum. If these crops are all pastured down, the hogs being fed a little grain meanwhile, the soil will improve. With such a system, at least on clay soils, the hogs must not be allowed on the fields when the soil is wet, as they will puddle it to such an extent as to do serious injury. To avoid this difficulty, there should be an additional field of good sod for the hogs to run on in wet weather. In sections where alfalfa thrives, hogs may be pastured on this crop in summer (in winter also in the far South) and fed a little corn. In winter such crops as rape and kale may take the place of the alfalfa, and the grain feed may thus be increased. Such a system takes nothing from the land, but care must be used not to puddle the soil by pasturing in wet weather. There should be a field of good sod in reserve for such periods.

STAY.

We may sum up the matter briefly thus: To build up and maintain fertility in the soil, feed a large part of the crops and return the manure to the land. If manure is not available, plow under crops grown for the purpose. Plow deep (but do not subsoil). Grow leguminous crops for the nitrogen they add to the soil.

Commercial fertilizers and lime may be important means of improving the soil, but the fertilizer requirements of different soils and different crops in different seasons are so little understood that we are not yet in a position to make positive recommendations that are of general application.

Facts Concerning Poultry.

Different breeds, their live weight, when full grown, the annual number of eggs they will lay, etc.

Breeds.	Live weight when full grown.	No. of eggs annually.	Breeds.	Live weight when full grown.	No. of eggs annually.
Brahmas, light.....	11½	120	Polish.....	9½	170
Brahmas, dark.....	10½	120	Spanish, black.....	7	170
Cochins, black.....	12	170	Ducks, common.....	10	90
Cochins, buff.....	12	170	Ducks, Aylesbury.....	10	90
Cochins, white.....	12	170	Ducks, Cayuga.....	10	90
Cochins, partridge.....	12	170	Ducks, Faint.....	10	90
Common.....	10	120	Ducks, Rouen.....	10	90
Bantams.....	6½	120	Geese, common.....	20	30
Dominique, American.....	8	170	Geese, African.....	20	30
Game, black-breasted, red.....	7½	170	Geese, Egyptian.....	20	30
Hamburg.....	8	170	Geese, Embden.....	20	30
Leghorns.....	7½	170	Geese, Toulouse.....	20	30
Leghorns, black.....	7½	170	Turkeys, common.....	12	100
Leghorns, brown.....	7½	170	Turkeys, black.....	12	100
Leghorns, game.....	7½	170	Turkeys, bronze.....	12	100
Leghorns, white.....	7½	170	Turkeys, buff.....	12	100
Plymouth Rock.....	7½	170	Turkeys, Narragansett.....	12	100

Feeds for Sheep.

In the course of several experiments by De Saumer, a French scientist, it was found that 1,000 pounds of different kinds of foods produced the following results. It will be seen by examination that when proved the most valuable food, barley came next, while mangold stood lowest in the scale.

Substance.	Amount of wool in 100 lbs. of wool produced.	Weight of wool produced.
Potatoes with salt.....	100	100
Potatoes without salt.....	100	100
Mangold-Wurzel.....	100	100
Wheat.....	100	100
Oats.....	100	100
Barley.....	100	100
Peas.....	100	100
Rye, with salt.....	100	100
Rye, without salt.....	100	100
Corn-meal, wet.....	100	100
Barley-meal.....	100	100

Matters of Interest to People who Cultivate the Soil

PRACTICAL FACTS TAKEN FROM REFERENCE TABLES

In Hill's Manual

AGRICULTURAL TABLES FOR FARMERS, GARDENERS AND OTHERS.

For many facts and figures in these various reference tables, credit is due the "American Almanac," edited by A. R. Spofford, "Moore's Universal Assistant," by R. Moore, the "American Farm and Home Encyclopedia," by H. R. Allen, "Farmers' and Mechanics' Manual," by Geo. E. Warring, "Statesman's Year Book," by Frederick Martin, "The Circle of Useful Knowledge" and other valuable works.

Vitality of Seeds.

Length of time that the seeds of various herbs and vegetables retain the "powers of germination."

Vegetables.	Years.	Vegetables.	Years.
Cucumber.....	3 to 10	Leek.....	3 to 5
Melon.....	3 to 10	Onion.....	3 to 5
Pumpkin.....	3 to 10	Parsley.....	3 to 5
Squash.....	3 to 10	Parasit.....	3 to 5
Broccoli.....	3 to 5	Pepper.....	3 to 5
Cauliflower.....	3 to 5	Salsify.....	3 to 5
Artichoke.....	3 to 5	Tomato.....	3 to 5
Endive.....	3 to 5	Egg plant.....	3 to 5
Pea.....	3 to 5		
Radish.....	3 to 5		
Beet.....	3 to 5		
Cress.....	3 to 5		
Lettuce.....	3 to 5		
Mustard.....	3 to 5		
Rhubarb.....	3 to 5		
Spinach.....	3 to 5		
Turnip.....	3 to 5		
Asparagus.....	3 to 5		
Beans.....	3 to 5		
Carrots.....	3 to 5		
Celery.....	3 to 5		
Corn (on cob).....	3 to 5		

Number to an Acre

Of plants or trees set at regular distances apart.

Distances apart.	No. of plants.	Distances apart.	No. of plants.
2 inches by 3 1/2 inches.....	600,000	6 feet by 6 feet.....	1,575
3 inches by 4 inches.....	300,000	6 1/2 feet by 6 1/2 feet.....	1,470
4 inches by 5 inches.....	175,000	7 feet by 7 feet.....	1,372
5 inches by 6 inches.....	100,000	7 1/2 feet by 7 1/2 feet.....	1,274
6 inches by 7 inches.....	75,000	8 feet by 8 feet.....	1,176
7 inches by 8 inches.....	56,000	8 1/2 feet by 8 1/2 feet.....	1,078
8 inches by 9 inches.....	42,000	9 feet by 9 feet.....	980
9 inches by 10 inches.....	30,000	9 1/2 feet by 9 1/2 feet.....	882
10 inches by 11 inches.....	21,000	10 feet by 10 feet.....	784
11 inches by 12 inches.....	15,000	10 1/2 feet by 10 1/2 feet.....	686
12 inches by 13 inches.....	10,000	11 feet by 11 feet.....	588
13 inches by 14 inches.....	7,500	11 1/2 feet by 11 1/2 feet.....	490
14 inches by 15 inches.....	5,600	12 feet by 12 feet.....	392
15 inches by 16 inches.....	4,200	12 1/2 feet by 12 1/2 feet.....	294
16 inches by 17 inches.....	3,000	13 feet by 13 feet.....	196
17 inches by 18 inches.....	2,100	13 1/2 feet by 13 1/2 feet.....	98
18 inches by 19 inches.....	1,500	14 feet by 14 feet.....	49
19 inches by 20 inches.....	1,000	14 1/2 feet by 14 1/2 feet.....	24
20 inches by 21 inches.....	750	15 feet by 15 feet.....	12
21 inches by 22 inches.....	560	15 1/2 feet by 15 1/2 feet.....	6
22 inches by 23 inches.....	420	16 feet by 16 feet.....	3
23 inches by 24 inches.....	300	16 1/2 feet by 16 1/2 feet.....	1
24 inches by 25 inches.....	210		
25 inches by 26 inches.....	150		
26 inches by 27 inches.....	100		
27 inches by 28 inches.....	75		
28 inches by 29 inches.....	56		
29 inches by 30 inches.....	42		
30 inches by 31 inches.....	30		
31 inches by 32 inches.....	21		
32 inches by 33 inches.....	15		
33 inches by 34 inches.....	10		
34 inches by 35 inches.....	7		
35 inches by 36 inches.....	5		
36 inches by 37 inches.....	4		
37 inches by 38 inches.....	3		
38 inches by 39 inches.....	2		
39 inches by 40 inches.....	1		

Cost of Producing Pork.

The cost of producing a pound of pork depends upon the cost of corn per bushel, as follows:

Cost per bushel of corn.	Cost of pork per hundred.
12 1/2 cts.....	61.00
13 cts.....	61.70
14 cts.....	62.40
15 cts.....	63.10
16 cts.....	63.80
17 cts.....	64.50
18 cts.....	65.20
19 cts.....	65.90
20 cts.....	66.60
21 cts.....	67.30
22 cts.....	68.00
23 cts.....	68.70
24 cts.....	69.40
25 cts.....	70.10
26 cts.....	70.80
27 cts.....	71.50
28 cts.....	72.20
29 cts.....	72.90
30 cts.....	73.60

Cost of Small Quantities of Hay.

Price per ton.	10 lbs.	20 lbs.	30 lbs.	40 lbs.	50 lbs.
Four dollars.....	40 cts.	80 cts.	1.20	1.60	2.00
Five dollars.....	50 cts.	1.00	1.50	2.00	2.50
Six dollars.....	60 cts.	1.20	1.80	2.40	3.00
Seven dollars.....	70 cts.	1.40	2.10	2.80	3.50
Eight dollars.....	80 cts.	1.60	2.40	3.20	4.00
Nine dollars.....	90 cts.	1.80	2.70	3.60	4.50
Ten dollars.....	1.00	2.00	3.00	4.00	5.00
Eleven dollars.....	1.10	2.20	3.30	4.40	5.50
Twelve dollars.....	1.20	2.40	3.60	4.80	6.00
Thirteen dollars.....	1.30	2.60	3.90	5.20	6.50
Fourteen dollars.....	1.40	2.80	4.20	5.60	7.00
Fifteen dollars.....	1.50	3.00	4.50	6.00	7.50

Facts About Sheep.

The weight of any animal at a certain age, will, of course, depend upon the manner in which it is fed and cared for. Supposing sheep to be well fed and sheltered, the following presents an average yield of flesh and wool at a certain age.

Breeds.	Wool.	Flesh.	Age at which yield is taken.
Cheviot.....	100	100	3
Lepus.....	100	100	3
Lincoln.....	100	100	3
Merino.....	100	100	3
Merino, Spanish.....	100	100	3
Southdown.....	100	100	3
Shropshire.....	100	100	3
Common "Scrub".....	100	100	3

Weight of Horses.

Breeds.	Weight.	Age at which weight is taken.
Cleveland Bay.....	1,000	3
Clydesdale.....	1,500	3
English draft.....	1,700	3
Hambletonian.....	1,000	3
Mambrino.....	1,000	3
Morgan.....	1,000	3
Percheron-Norman.....	1,700	3
Pony-Canadian.....	800	3
Pony-Mustang.....	800	3
Pony-Shetland.....	800	3
"Scrub" or Fallow.....	800	3
Thoroughbred.....	1,200	3
Am.....	1,000	3
Male.....	1,000	3

Quantity of Seed Required to Sow or Plant an Acre.

Kind of Seed.	Quantity.	Kind of Seed.	Quantity.
Asparagus in 15-inch drills.....	15 qts	Egg plant, plants 3 by 3 feet.....	400
Asparagus plants, 4 by 1 1/2 feet.....	800	Endive, in drills 1 1/2 feet.....	300
Barley.....	1 1/2 bu	Flax, broadcast.....	30 qts
Beans, bush, in drills 3 1/2 feet.....	1 1/2 bu	Grass, timothy with clover.....	30 qts
Beans, pole, Lima, 4 by 3 feet.....	80 qts	Grass, timothy without clover.....	19 qts
Beans, Carolina, prolific, 4 by 3.....	10 qts	Grass, red top or berds.....	30 qts
Beets and mangold, drills, 3 1/2 feet.....	10 qts	Grass, blue.....	30 qts
Broom corn in drills.....	10 bu	Grass, rye.....	30 qts
Cabbage, outside, for transplanting.....	150	Grass, millet.....	30 qts
Cabbage, down in frames.....	6 bu	Hemp, broadcast.....	15 bu
Carrot in drills, 3 1/2 feet.....	6 bu	Kale, German green.....	3 bu
Celery, seed.....	600	Lettuce, in rows 3 1/2 feet.....	3 bu
Celery, plant, 4 by 1 1/2 feet.....	30,000	Look.....	4 1/2 bu
Clover, white Dutch.....	15 bu	Lawn grass.....	30 bu
Clover, Alsike.....	15 bu	Melons, water, in hills 3 by 3 feet.....	3 bu
Clover, large red with timothy.....	12 bu	Melons, citrons, in hills 4 by 4 feet.....	3 bu
Clover, large red without timothy.....	12 bu	Onion.....	3 bu
Corn, field.....	10 qts	Onion, in drills 3 1/2 by 3 1/2 feet.....	30 bu
Corn, salad, drill 10 inches.....	30 qts	Onion, in beds for sets.....	30 bu
Cucumber, in hills.....	3 qts	Onion, in rows for large bulbs.....	3 bu
Cucumber, in drills.....	4 qts	Parasit, in drills 3 1/2 feet.....	3 bu
		Pepper, plants, 2 1/2 by 1 foot.....	17,400
		Pumpkin, in hills 3 by 3 feet.....	3 qts
		Parasit, in drills 3 1/2 feet.....	4 bu
		Peas, in drills, short varieties.....	3 bu
		Peas, in drills, tall varieties.....	1 to 1 1/2 bu
		Peas, broadcast.....	3 bu
		Peas, broadcast.....	3 bu
		Radish, in drills 3 feet.....	10 bu
		Rye, broadcast.....	15 bu
		Rye, drilled.....	15 bu
		Salsify, in drills 3 1/2 feet.....	10 bu
		Spinach, broadcast.....	30 bu
		Squash, bush, in hills 4 by 4 feet.....	3 bu
		Squash, running, 3 by 3 feet.....	3 bu
		Turnip.....	3 qts
		Turnip, in drills 3 feet.....	15 bu
		Turnip, broadcast.....	3 bu
		Tomatoes, in frames.....	300
		Tomatoes, seed in hills 3 by 3 feet.....	300
		Tomatoes, plants.....	1 1/2 bu
		Wheat, in drills.....	3,000
		Wheat, broadcast.....	300

Benefits of Small Farms

The Island of Jersey, situated in the English Channel, eleven miles long and less than six miles wide, nourishes a population of about two persons to the acre, or 1,300 inhabitants to the square mile.

Compare this density of population with old thickly-settled Massachusetts, settled in 1620, having 418 persons to the square mile; with Rhode Island, having 508 1/4 persons to the square mile; with California and its delightful climate but having a population of only 15.3 inhabitants to the mile; and Wyoming with 1 1/2 inhabitants to the square mile.

The density of population and capacity for supporting a dense population on small areas of land in the old countries is largely the result of fertilization and intensive cultivation, the increased crop output coming from restricted area of farm land compelling better cultivation.

It is readily seen in this what an immense increase of foodstuff would be produced if all land were made to do its best by manuring and cultivation.

To Stop Land Monopoly

Various plans have been suggested for reducing the size of farms and increasing the size of crops. Among these is Single Tax.

Henry George, in a visit to Europe, had his attention called to the vast inequality of land ownership. For the purpose of breaking up the enormous monopolies of land which he found there, he devised the system of Single Tax, which various regions of the world are beginning to adopt. That system proposes that the tax on all land shall be five per cent on its rental value.

That is, for any tract of land which upon being sold and the money coming from the sale placed at interest would yield a certain sum at five per cent interest, that that amount of interest should represent the amount of tax which the land owner should pay.

Thus, the individual who owns a tract of land, say 100 acres adjoining a town, the land not in cultivation, yet worth \$300 an acre, as other land around it sells:

That the owner of that 100 acres can any minute sell that property for \$30,000, which placed at interest at 5 per cent would yield in interest the sum of \$1,500.

Yet the owner of the 100 acres will not sell. He is holding his land from sale expecting as the town grows in population to get \$1,000 per acre. The single tax advocate looks up the tax on that 100 acres and finds that the owner pays a very small tax, whereas it is clearly a property worth \$30,000 and may pay its 5 per cent tax which would be \$1,500 annually.

The single taxer claims that this tax, entirely reasonable, would induce the owner to sell such tract of land in small parcels and thus the monopoly of that land would be broken.

Vacant City Lot Cultivation

Some years since an association was formed in Philadelphia for the purpose of utilizing the vacant lots throughout that city.

In a report of the work of the association we find the following:

First: That many people out of employment must have help of some kind;

Second: That a great majority of them prefer self-help and many will take no other. Nearly all are able and willing to improve any opportunities open to them;

Third: That to open opportunities to them does not pauperize or degrade, but has the opposite effect of elevating and ennobling. It quickly establishes self-respect and self-confidence. The best and most effectual way of helping people in need is to open a way whereby they may help themselves. The most effective charity is to give opportunity accompanied with kindly and a personal interest in those less fortunate than ourselves.

Benefit of Vacant Garden Associations

Among the benefits resulting from vacant garden associations which have been established in various eastern cities in the last few years are:

Help extended to many families in need; they have taught the inexperienced how to get a living from the soil and in the hundreds of garden plots that have been cultivated they have demonstrated what can be grown on various sized parcels of land.

To illustrate: "An area of 150x100, about two-fifths of an acre, is generally sufficient to supply a family of five persons with vegetables, not considering the winter supply of potatoes, but the acre must be well tilled and handled according to Bailey in 'Principles of Vegetable Gardening'."

The Product of an Acre

One farm in the Sacramento Valley, California, consists of one single acre of irrigated land and gives a better home and larger net income for its owner than many of his neighbors enjoy on places of thousands of acres each. The little farm is at Orland, in Glenn County, and is the property of Samuel Cleck, who has grown old tilling it for the past thirty years.

Mr. Cleck makes a comfortable living from this one acre and is able to save an average of \$400 a year besides. He has money to loan, if not to burn, as well as fruit, vegetables, and poultry products to sell to those who are getting poorer every year in carrying big farms without irrigation. Here is a list of:

What the Place Contains

Barn and corral space, 75x75 feet; rabbit hutch, 25x25 feet, house and porch, 30x30 feet, two windmill towers, 16x16 feet each; garden, 45x94 feet; blackberries, 65x90 feet; citrus nursery, 90x98 feet, in which there are 23,000 trees budded, one row of dewberries, 100 feet long; 4 apricot; 2 oak trees; 3 peach trees; 6 fig trees; 10 locust trees; 80 assorted roses, 20 assorted geraniums; 12 lemon trees, bearing, which are seven years old; lime tree, nine years old and bearing, from which were sold last year 100 dozen limes; 8 bearing orange trees; 4 bread-fruit trees, 5 pomegranate trees; one patch of bamboo; 3 calla lilies; 4 prune trees; 3 blue gum trees, 6 cypress trees, 4 grape vines; 1 English ivy; 1 honeysuckle; 1 seed bed, one violet bed, 1 sage bed, 2 tomato vines; 13 stands of beca. (Wm. E. Smythe in Maxwell's Tallyman)

California is not the only place in America where a man can live on a few acres of ground, by intensive culture and with irrigation. Canada can present just as good if not better, opportunities, especially where land in small tracts is available near large cities.

At Hyde Park, a little village three miles north of Reading, Pa., there is a small farm owned by Oliver R. Shearer, who may be said to be one of the most successful farmers in the United States. This farm contains 3 1/3 acres, only 2 1/4 of which are cultivated, but they yield the owner annually from \$1,200 to \$1,500. From profits of his intensive farming Mr. Shearer has paid \$3,800 for his property, which, besides the land, consists of a modern two-story brick house with barn, chicken yard, and orchard, the whole surrounded by a neat fence. He has also raised and educated a family of three children.

There are no secrets, Mr. Shearer says about his method of farming. A study of conditions, the application of common-sense methods and untiring energy, he asserts, will enable any farmer to do what he has done.

Amount of Fruit Grown on an Acre

And Average Price at Which It Will Sell.

Blackberries, 10,000 qts. at 7c a qt.	\$700
Dewberries, 9,000 qts. at 7c a qt.	630
Gooseberries, 250 bu. at \$2.00 a bu.	500
Strawberries 4,000 qts. at 5c a qt.	400
Currants, 3,000 plants yield 6,000 bu.	200
Raspberries, per acre.	\$200 to 600
Peaches, per acre	200 to 400
Apples, per acre	100 to 500
Grapes	100

Profits from an Acre of Vegetables

Asparagus, 3,000 bunches at 20c per bunch.	\$600
Cauliflower, 100 to 300 bbis. at \$1.50.	450
Onions, 600 bu. at 75c per bu.	450
Cabbage Seed, 1,000 lbs. at 40c lb.	400
Brussels Sprouts, 3,000 qts. at 10c per qt.	300
Celery, 6,000 bunches at 5c per bunch.	300
Lettuce, 9,000 heads at 3c a head.	270
Lima Beans, 50 bu. at \$5.00 a bu.	250

THE VEGETABLE GARDEN

How to Prepare Soil, Plant, and Fertilize

COMPILED FROM PUBLICATIONS OF PETER HENDERSON

Author of many books on Agriculture and Horticulture

Location of vegetable garden.—Where a choice can be made, the ground selected for the growing of vegetables should be level; if any slope, it should be smooth and toward the South. If the garden is protected from the North and Northwest winds by either a hill, a tree wind-break, a high board fence or wall, it will greatly facilitate earliness in producing crops.

Selection of suitable soil.—This is a most important factor in the growing of vegetable crops. A sandy loam, at least a foot deep, with plenty of humus incorporated, overlying a gravelly or sandy subsoil through which surplus water readily filters, is the ideal for most vegetables, especially for early crops. The soil should be "quick," that is it should warm up early in the spring, and quickly get into working condition after rains. Should the subsoil be clay, then under-drainage, or at least subsoil plowing is essential. For late crops, especially for late peas, beans, cabbage and celery, a cooler soil is desirable, such as a well-drained clayey loam of friable texture. **Hard clay is to be avoided** always; it is cold, late, and hard to work, either wet or dry; plants start slowly and grow poorly in it. The physical condition of garden soil is considered of more importance every year, as better understood. Even the question of fertilizing is less vital to the production of bountiful crops, for if the physical texture is not suitable the effect of fertilizers is lost. The elementary principles are these: Originally soil was, and in rare localities still is, purely disintegrated rock, a chemical analysis of which might indicate an abundance of all of the essentials of plant food structure. Yet these constituents are so locked up in an insoluble form that but few plants, excepting lichens and the like, can extract the nutriment requisite for their growth. Slowly these rock particles are fined down by frost, rain and the other varied processes of nature, and gradually accumulate and become associated with animal remains and decayed vegetable matter (humus), thus forming the organic matter of soils, which retains the soil moisture and holds in solution the dissolved constituents of plant food, and plants thrive (other conditions being congenial) in proportion to their supply of requisite foods held in solution, for the only way they can absorb their food is through their root hairs.

Effect of Humus in Fertilizing

Humus improves the texture of the soil by rendering it open and mellow and it also contains plant food. Should the soil be lacking in humus, then it must be incorporated by plowing under some growing crop, preferably clover or some leguminous crop, because the, add nitrogen to the soil which they derive from the air. **Stable manure** assists in obtaining similar results. Aeration or Ventilation of the Soil is another essential condition to enable the millions of soil-germs (bacteria) in the soil to continue their work of converting the crude materials of manure and all organic matter into available plant food, for plants do not feed upon the raw fertilizers, etc., as they are put into the soil. **Soil ventilation** also enables the warm sunshine to more readily effect its share in the transformation taking place below the surface of the soil. Paradoxical as it may seem to the unthinking, yet one of the most serious problems of successful gardening is in supplying a continuous abundance of moisture to the growing plants, and yet allow sufficient air for the micro-organisms in the soil to thrive and surcharge the moisture with available plant food. **There must not be too much air, nor too much water,** but that happy balance which is most nearly obtained in a finely pulverized, mellow, sandy loam with an open subsoil.

Importance of Necessary Moisture

The Water-Storing Capacity of Soil is Dependent upon the Texture. The finer the texture of suitable loamy garden soil the greater will be the water-

holding capacity, and the more uniformly will it be distributed. When rain saturates soil every individual atom of soil is enveloped with a film of moisture, and the smaller and more numerous the particles the more water is contained in a given space, on the same principle that a clay marble withdrawn from the water will be enveloped with a film of moisture equal to the marble's surface, but break the marble into a thousand pieces and the aggregate surface area would then be increased by about one hundred times, this illustrates the water-storing value of well-pulverized soil over coarsely-grained soil.

Necessity of Proper Drainage

Drainage is very essential for many garden soils, especially those of clayey texture or having clay subsoils. Nature's Drains, namely gravity or sandy subsoils, are the best, but when gardens are not situated over such, then we must resort to artificial drainage. For temporary purposes the land may be ridged, thus forming dead furrows, which act as surface drains, but these simply carry off the surface water and do not improve the texture of the soil like under-drainage, which makes the soil looser, more friable, and earlier. Clayey soils will cement or puddle when they remain wet for a long time and finally dry out hard and brick-like, whereas, if the surplus water is allowed to percolate through them and is drained off from below, cementing does not take place and the soil becomes friable, in which condition it retains the capillary moisture necessary for growing crops. Garden soil may be excellent in all respects and yet remain wet and "spongy," so that it is impossible to work or plant it until very late in the spring—the drains should be placed about 3 feet below the surface and in stiff, clay soil lateral drains should be about 18 feet apart—in lighter, more porous soils, 20 to 25 feet apart, and in exceptional locations and soils, 50 to 75 feet will answer.

Best Materials for Drains

Drains, of course, should have a clear outlet to allow unimpeded flow, and to secure this in some situations it may be necessary to connect the laterals with main drains, which should be placed somewhat deeper than the laterals; the positions of the mains depend entirely upon the lay of the land and the outlet to secure the necessary fall. The best and most effectual drains for a long term of years are those made with **drain tiles**, either the "sold" tile or the "horseshoe" pattern; the latter we prefer. We place this pattern of tile on narrow hemlock boards at the bottom of the trench, which prevents sagging where there may be a soft spot in the earth, a strip of sod, grass down, is then placed on the joints of the tile to prevent earth getting in and stopping the flow—the trench is then filled in. Cheaper drains are made by filling in the bottom of a 3-foot trench with about a foot of stones, placing the stones so they form a continuous conduit at the bottom; cover the stones first with straw, brush or sod before filling the trench with soil. Board drains are made by nailing 3 boards together thus Δ.

Plowing to Loosen Soil

Plowing.—The object of plowing is to pulverize the soil, and the character of the soil and the intended crop determines the depth. Under average conditions plow as deep as possible so long as the subsoil is not turned up, endeavor to deepen the soil, and if the subsoil is near the surface run a subsoil plow in the furrow of the turning plow.

How to Make Seed Grow

The subsoil plow does not turn a furrow, but, like a huge mole, it lifts and breaks the hard crust that forms under the ordinary plow, thus deepening the soil and allowing the roots to penetrate deeper, and rendering the crop less susceptible to drought. **Shallow plowing** is advisable in sandy, leachy soils, the object being to plow the same depth every year, so as to compact the undersoil and restrain leaching. **Fall plowing** improves the physical condition, especially of heavy, loamy soils, left rough, the lumps slack and break down through the action of winter weather. Such soils, however, should contain plenty of vegetable matter, grain or grass, and be covered with manure before plowing, to prevent any tendency of the soil to puddle or run together. Light and sandy soils that dry out quickly in spring and are naturally early do not need to be plowed in the fall.

Rolling.—The object of rolling soil is to compact light soils—break up lumps and pulverize heavier soils—rolling brings capillary water to the surface, and to prevent loss of same by evaporation on the ground should be gone over within a day or two after rolling with a harrow.

Success with Seeds

Seed Beds.—Finely pulverized mellow soil, continuously moist, and a congenial temperature are the essentials to success in germinating seeds. An even and continuous supply of capillary moisture to some extent regulates the soil temperature and this moisture—from the soil below—can be brought up to the seeds and soil surrounding them by merely compacting the soil over them with the foot, a plank or a roller; this, if properly done with mellow, dryish soil, brings the soil particles in contact and establishes the capillarity necessary to bring the moisture from the undersoil to the surface, thus hastening the germination of shallow-sown seeds that might otherwise "dry out."

Better Get Moisture from Below

When moisture from below can be secured it is better than surface watering from a watering pot or hose as they tend to cause the soil to crust over, of course, keeping seeds moist by capillarity is wasteful of the undersoil's stores of moisture, for it passes off into the air. So it is advisable, as soon as the seedlings are rooted and sturdy enough, to stir and loosen the surface soil about them, thus forming an "earth mulch" to check evaporation. Where large seeds, like beans, peas, etc., are sown deep, after the soil has been firmed over them, then the surface can be immediately loosened so there may be no undue loss of moisture.

Secret of Success in Dry Farming

Cultivation to Conserve Soil Moisture.—Many people imagine that as long as a garden crop is free from weeds it does not need to be cultivated, but nothing could be further from the fact; frequent cultivation, at least once in every ten days, is one of the most important factors in the successful growing of vegetable or other crops, and especially so in dry weather. Growing plants require an immense amount of moisture and for perfect and unchecked development must have it continuously. As rain falls irregularly, plants must depend for their supply during dry periods upon the reserve moisture stored in the soil below them, as we have described previously in this article, and it is only by frequent cultivation that we can prevent this reserve moisture from escaping by capillary conduction into the dry summer atmosphere.

Cultivate 3 inches deep.—If the capillary tubes—between the stores of moisture and the surface—are not kept disconnected in dry weather, the quantity of moisture, drawn forth as effectually as through a suction hose, by drying winds and air, will in a few days' time deplete the entire reserve store. The capillary rise of water to make good the evaporation from the surface sometimes equals a pound of water per square foot of soil a day. Therefore, one can realize the importance of checking this loss as soon as possible, which is effectually accomplished by cultivating the soil at least 3 inches deep, leaving the surface pulverized and open, thus forming an "Earth Mulch," and before the surface compacts again, allowing the suc-

tion tubes to be connected the ground should be again cultivated. By using the hand-power wheel hoe and cultivators for small gardens and the riding horse cultivators for market gardens, the work may be done cheaply, quickly and easily.

Manures and Fertilizers.—This is a large question and the limited space at our disposal only allows us to sketch it. (Those interested should get a special book on the subject; "Fertilizers by Voorhees," one of the latest, is recommended.)

Some Plants Come from the Air

Plants are composed of many ingredients, some of which are drawn from the air and over which we have no control, but most of the materials for growth and structure are supplied through the soil, and we can, when necessary, supply the deficiencies. Most of the plant-building constituents of the soil are therein stored in superabundance, and for one day the soil may take into consideration when the fertilizer question is considered, but there are three constituents: nitrogen, potash and phosphoric acid, that generally have to be supplied by the gardener. **Plants cannot grow** after the supply of any one ingredient has been exhausted, on the principle that a chain is no stronger than its weakest link. To grow vegetable crops to perfection liberal quantities of plant-feeding materials must be applied to the soil, and we always find it advisable to use both manures and commercial fertilizers.

Best Manures

Natural Manures (stable manures, etc.) usually contain varying quantities of the three essentials above mentioned, and when manure is intelligently stored and cared for, these essentials may all be retained until the manure is applied to the soil, but it is too frequently the case that "drinking," "leaching," etc., cause more or less loss, reducing the value of such manure to its usefulness as humus. Natural manures feed plants more slowly but more continuously than chemical fertilizers and improve the texture of the soil, the effects of which last for more than one season—50 to 100 tons per acre is not too much to apply to a garden before plowing.

Commercial Fertilizers

Artificial or commercial fertilizers act immediately, starting the plants into an early and rapid growth, and hasten maturity. A high-class "complete fertilizer," suitable for the variety of vegetables usually grown in a garden, containing all three of the needed constituents in about the following proportions: 98 lbs. nitrogen, 120 lbs. phosphoric acid and 120 lbs. potash per ton, and should be applied after plowing and before harrowing at the rate of 500 to 1,000 lbs. per acre, and rowed crops may be further stimulated by 2 or 3 supplementary side-dressings during the growing season, using 100 to 200 lbs. per acre for each application. **Commercial fertilizers** are composed of some base or superstructure, such as ground bone, phosphate rock, etc., to which the three plant-feeding essentials—nitrogen, potash, and phosphoric acid—are added in varying quantities suited to the needs of the crop the fertilizer is going to feed. As the quantity of each of the three essentials contained in a ton is always known, and as we know the average proportions that various crops consume, it enables us to approximately estimate the quantities to apply. The missing factor in enabling us to gauge the exact amount required of the essentials is the unknown quantity of each already in the soil. This can be approximately judged only by experimental plots on which different crops and different essentials are used. (Full instructions and tables for this experimental work are given in several works on Fertilizers.)

Nitrogen and Potash

Nitrogen is conducive to rapid growth and should be used more freely early in the season when tender and succulent growth, especially leaf-growth, is desired.

Potash hardens the wood-growth and checks too succulent leaf-growth, hastens maturity, and causes the plant to throw more vigor into fruits or flowers.

Importance of Firming the Soil

Make Soil Firm

The importance of firming the soil after seeds are sown and covered is a detail that is not usually appreciated by the amateur gardener. And, in consequence, there is often a disappointment because seeds either do not "come up" or germinate feebly and irregularly.

The failure to properly firm the soil after seeds are sown also has its effect upon the later growth and maturity of crop, particularly in light soil or during a dry season, as it allows too free a circulation of drying air and wind around the roots, depriving the plants of moisture and checking the growth. The plants, for it must be remembered that a small amount of moisture is necessary, not only to prevent plants from wilting, but also to enable them to assimilate their food, which is conveyed only in solution, through their root hairs.

Vegetable, Flower, and Farm Seeds

A soil may be ever so rich in fertilizing constituents, but if there is not sufficient moisture to dissolve these essentials, and if this plant-fooding solution is prevented by barriers of dry atmosphere, then the plants languish, and possibly the crop "burns up." If the weather continues hot and dry, therefore, we cannot too strongly impress upon the cultivator the vital importance of properly compacting the soil, if dry enough, after sowing and covering seeds; whether vegetable seeds, flower seeds, farm seeds, or grass seeds. Of course, there are conditions of soil and weather that render it inadvisable to press the soil too compactly about the seeds, as when the soil is heavy or too wet, or

in very early spring or late fall, when copious rains can be depended upon to perform the operation for us, and when there is no danger from hot, drying atmosphere.

Press Soil with Foot

Under ordinary conditions when soil is of the mellow, friable and crumbly texture, in which it is suitable to sow seeds, then the planter should press every inch of soil over the seeds with the ball of his foot, allowing his whole weight to come on it, or the spade or a narrow board may be placed over the row, and be stepped down. But the foot is best immediately over the seeds, bringing the moist soil into intimate contact with them, thus including quick and even germination, and giving them an earlier start than the weed seeds in the lighter soil between the rows.

Loosen Soil After Pressing

After the soil has been firmed as above described, the surface should be lightly raked over with a short-tooth rake, to prevent any tendency to "bake," or form a "crust," through which seedlings might have difficulty in forcing their way. This light raking looses the immediate surface loose, like a "mukh," thus breaking the capillary tubes through which the soil moisture would otherwise escape.

In large gardening and field operations and on lawns, it is of course impossible to firm the soil with the foot, so the roller should be used to accomplish a similar result.

GENERAL DIRECTIONS RELATING TO GARDEN VEGETABLES

Kind of Vegetable.	Days to "Come Up."	Ready for Use from Seed Sown.	Distance Table		Quantity of Seed, etc., Required.
			Apart in Rows	Rows Apart.	
Asparagus, Seeds	20 to 28	3 to 4 years	1 ft.	2 ft.	2 oz. for 100 ft. row.
Asparagus, Roots	6 to 10		3 in.	2 ft.	100 for 100 ft. row.
Beans, Dwarf	6 to 10	45 to 75 days	3 ft.	2 ft.	1 qt. for 100 ft. row.
Beans, Pole and Lima	6 to 10	60 to 100 days	3 ft.	2 ft.	1 qt. for 100 ft. row.
Beets	7 to 10	60 to 75 days	4 in.	4 ft.	1 qt. for 100 ft. row.
Borecole (Kale) for spring use	6 to 10	85 to 120 days	2 ft.	2 ft.	2 oz. for 100 ft. row.
Borecole (Kale) for fall use	6 to 10	85 to 120 days	2 ft.	2 ft.	2 oz. for 100 ft. row.
Brussels Sprouts	6 to 10	100 to 120 days	1 1/2 ft.	2 ft.	1/2 oz. for 100 ft. row.
Cabbage, Early	6 to 10	100 to 125 days	1 1/2 ft.	2 ft.	1/2 oz. for 100 ft. row.
Cabbage, Late	6 to 10	120 to 180 days	2 1/2 ft.	2 ft.	1/2 oz. for 100 ft. row.
Carrot, Early	10 to 15	65 to 85 days	5 in.	1 1/2 ft.	1 oz. for 100 ft. row.
Carrot, Late	6 to 10	100 to 115 days	1 1/2 ft.	2 ft.	1 oz. for 100 ft. row.
Cauliflower, Early	6 to 10	100 to 125 days	1 ft.	3 ft.	1/2 oz. for 100 ft. row.
Cauliflower, Late	6 to 10	125 to 150 days	6 in.	3 to 5 ft.	1/2 oz. for 100 ft. row.
Celery	12 to 20	60 to 85 days	3 ft.	4 ft.	1/2 oz. for 100 ft. row.
Corn, Sugar	8 to 10	125 to 150 days	4 ft.	4 ft.	1 qt. for 200 hills.
Cucumber	6 to 10	75 to 100 days	2 1/2 ft.	2 ft.	1 oz. for 60 hills.
Egg Plant	6 to 10	65 to 85 days	1 ft.	1 ft.	1 oz. for 100 ft. row.
Endive	6 to 10	120 to 180 days	6 in.	1 1/2 ft.	1/2 oz. for 100 ft. row.
Kohi Rabi	6 to 10	75 to 100 days	1 ft.	2 ft.	1/2 oz. for 100 ft. row.
Leek	6 to 10	65 to 85 days	1 ft.	2 ft.	1/2 oz. for 100 ft. row.
Lettuce	6 to 10	75 to 100 days	1 ft.	2 ft.	1/2 oz. for 100 ft. row.
Melon, Musk	6 to 10	90 to 120 days	4 ft.	4 ft.	1/2 oz. for 100 ft. row.
Melon, Water	6 to 10	100 to 125 days	8 ft.	8 ft.	1 oz. for 60 hills.
Onion, Seed	8 to 12	120 to 150 days	3 in.	1 ft.	1 oz. for 30 hills.
Onion, Sets	6 to 10	90 to 100 days	4 in.	1 ft.	1 oz. for 100 ft. row.
Parley	18 to 24	100 to 150 days	6 in.	1 ft.	3 pts. for 100 ft. row.
Peas, Wrinkled	12 to 18	50 to 75 days	2 in.	2 to 4 ft.	1 qt. for 100 ft. row.
Peas, Smooth	5 to 10	80 to 100 days	2 in.	2 to 4 ft.	1 qt. for 100 ft. row.
Pepper	5 to 10	75 to 100 days	2 ft.	2 ft.	1/2 oz. for 100 ft. row.
Potatoes	10 to 14	125 to 150 days	10 in.	2 1/2 ft.	1/2 oz. for 100 ft. row.
Pumpkins	15 to 25	100 to 125 days	8 ft.	8 ft.	1 peck for 100 ft. row.
Radish	4 to 6	25 to 50 days	2 to 4 in.	1 to 1 1/2 ft.	1 oz. for 30 hills.
Spinach	8 to 12	60 to 75 days	4 in.	1 1/2 ft.	1 1/2 oz. for 100 ft. row.
Squash, Summer	6 to 10	60 to 75 days	4 ft.	4 ft.	1 oz. for 100 ft. row.
Squash, Winter	6 to 10	125 to 150 days	3 ft.	3 ft.	1 oz. for 50 hills.
Tomato	6 to 10	60 to 75 days	6 in.	1 to 1 1/2 ft.	1/2 oz. for 100 ft. row.
Turnip	4 to 7	60 to 75 days	3 ft.	3 ft.	1 oz. for 50 hills.

FORTY VARIETIES OF GARDEN VEGETABLES

How to Plant and Cultivate

Vegetable Plants in Colors Shown on Following Pages

Artichoke

Artichoke, Ger. Artichaut, Fr.
Sow seeds in deep, rich, sandy loam with plenty of rotted manure. When large enough, transplant into rows three feet apart and two feet in the rows.

This vegetable is a great delicacy, highly valued in all parts of Europe, and also one of the most prominent table vegetables in California and other parts of this country. It is a perennial producing the large flower heads, which are the part eaten, the second season, and every year thereafter. The young stalks are also sometimes tied and blanched like celery, but they are not equal to the flower heads. Cook like asparagus and serve with cream or butter sauce. Sow seed early in hotbeds or box in the house, and when weather becomes settled transplant in rows four feet apart and two feet in the row. When started early sometimes blooms the first year.

One Variety

The Globe Artichoke is cultivated for its flower-heads, which are cooked like asparagus. Plants set in any good soil, with slight covering in winter, will remain in bearing several years.

Asparagus

One of the earliest and most delicious of spring vegetables. We strongly urge all those having enough available space to put in a bed for their own use, following carefully the cultural directions given below.

Beds are usually formed by setting roots, which can be procured. If you wish to grow plants from the seed yourself, pour warm water on the seed and allow it to stand until cool; pour it off and repeat two or three times with fresh warm water. Sow in spring in drills about 18 inches apart and 2 inches deep, in light, rich soil, planting 15 to 20 seeds to each foot of row. When the plants are well up, thin to about one inch apart and give frequent and thorough cultivation during the summer. If this has been well done, the plants will be fit to set the next spring.

The permanent beds should be prepared by deep plowing or spading and thoroughly enriching the ground with stable manure or other fertilizer; a moist, sandy soil is best. If the subsoil is not naturally loose and friable, it should

be made so by thoroughly stirring with a subsoil plow or spade. Set the plants about 4 inches deep and 1 to 2 feet apart in rows 4 to 6 feet apart. After the plants are well started, give frequent and thorough cultivation. Early the next spring spade in a heavy dressing of manure and about one quart of salt and double the quantity of fresh wood ashes to each square rod, and cultivate well as long as the size of plants will permit, or until they begin to die down. The next season the bed may be cut over two or three times, but if this is done, all the shoots, no matter how small, should be cut. After the final cutting, give a good dressing of manure, ashes, and salt. Cultivate frequently until the plants meet in the rows.

In autumn after the tops are fully ripe and yellow, they should be cut and burned. A bed 15 feet by 50 feet, requiring about 100 plants, if well cultivated and manured, should give the following season an abundant supply for an ordinary family and continue productive for 8 or 10 years.

Three Varieties

Palmetto.—A very early maturing and prolific variety, producing an abundance of very large, deep green shoots of the best quality.

Conover's Colonial.—This sort is one of the largest and most extensively used green varieties. Shoots bright green, sometimes tinged with purple at the top, very tender and of the best quality.

Early Giant Argenteuil.—A French variety of excellent quality, very early, stalks large and thick, resists ravages of rust and blight better than any other sort.

Asparagus Seed

One Ounce Will Sow About 50 Feet of Drill

Sow in autumn, or spring, when soil is in good working condition. Cultivate during summer; give plants light covering of stable litter during winter. At 1 or 2 years, transplant to permanent beds.

Asparagus Roots

A saving of 1 or 2 years is effected by planting roots. For this you should select strong 2-year-old roots. For private use or for marketing on a small scale, beds should be formed 5 feet wide, with 3 rows planted in each, one in the middle and one on each side a foot from edge; distance between plants in rows, 9 inches.

Beans

Bohnen, Ger. Fajolencano, Sp. Haricot, Fr.

Planting requires 1 quart to 10 feet of drill on 200 hills, 2 bushels per acre, in drills.

Warm, light, slightly fertilized soil, in a sunny situation, should be used. As soon as all danger of frost is past, plant in drills 18 to 30 inches apart, 2 inches in depth, and at a distance of 3 to 6 inches in the row; the distance between both drills and plantings varying according to the habits of the varieties used. If hills be preferred, space them 2 feet apart one way and 3 feet the other. Never work among the vines when wet, as it induces rust.

A succession of sowings can be made from the first week in May until September. Plant in drills about 2 inches deep, and from 18 inches to 2 feet apart, according to the richness of the soil; the plants should be about 3 inches apart.

Pole Lima Beans

Lima beans are not only profitable as green shell beans, but are also a paying crop to sell as dried beans during winter. They are always in demand and bring good prices.

Lima beans will not grow until the weather and ground are warm; if planted earlier, the seeds are apt to rot in the ground.

Two Varieties

Seibert's Early Lima.—In earliness, ease of shelling, and quality of the green beans, this variety is far in advance of all other early Limas for either the garden or market. The vine is very productive; although the pods rarely contain more than four beans, the total yield is enormous. The green shelled beans are of immense size, tender, and of finest quality.

King of the Garden Lima.—Vines vigorous and productive, producing a continuous bloom and fruitage to the end of the season. The pods are of enormous size, many specimens measuring from 5 to 8 inches, and some containing seven beans to the pod, all perfectly formed and of superior quality.

Dwarf, Bush or Snap Beans

In many localities the low-growing varieties are known under different names. Under this classification we include the best sorts selected after years of careful observation—bush, bunch, snap, string or dwarf beans.

Forty Varieties of Garden Vegetables. How Plant and Cultivate

About the first of May select a warm, dry, sheltered spot, dig and manure slightly; make drills 2 inches deep and 18 inches to 2 feet apart; drop the beans 3 inches apart in the drills, and cover not more than 2 inches deep. Hoe well in dry weather to keep down the weeds. Sow every two weeks for a succession until September. 1 qt. to 100 ft. of drill; 1½ bu. to the acre in drills.

Four Varieties

Improved Red Valentine.—For snaps there is nothing superior to this variety among the green-podded sorts, and many prefer it to the wax varieties. Vine erect, with dark-green leaves, pods medium length, curved cylindrical, with crease in back, very fleshy, crisp and tender, seed long, of medium size and unsymmetrical in shape; pink, marbled with red.

Black Valentine.—An extra early green-pod bean. It produces long pods that are almost straight round, thick and meaty. They are soft green in color; in flavor unsurpassed. A good bean to force as well as to use for late planting.

Challenge Black Wax.—Fully one week earlier than any other. Pods clear waxy white, round, fleshy, crisp and tender. The dry bean is jet black, long, curved, and rather flat.

Currie's Rust-Proof Wax.—Pods long, flat and tender. Seeds blue-black.

Pole, or Running Beans

One quart will plant 100 hills. Plant in hills 3 to 4 feet apart each way, and 2 inches deep, allowing 6 seeds to each hill. When the plants are well established they should be thinned out to four. They are more sensitive to cold than the bush beans, and should not be planted before the middle of May.

Three Varieties

Extra Early Jersey Lima.—This is ten days earlier than the ordinary variety, while it is equal in flavor and productiveness.

Dreer's Improved Lima.—Beans thick, sweet and tender, very productive.

Large White Lima.—A large, late sort; broad, very thick, dark green.

Dwarf Lima Beans

Bush limas should be planted 3 feet apart, dropping 2 or 3 beans 15 inches apart in the row. Cover about an inch deep. Dwarf limas require no support.

Three Varieties

Burpee's Dwarf Lima.—Plants make perfect bushes from 18 inches to 2 feet high. They are sure croppers and immense yielders. Pods as large as those of the pole lima, and contain three to five beans of the best quality.

Dreer's Dwarf Lima.—Thick pods and large thick beans, three or four in a pod. Ripens fully ten days earlier than the pole lima of same name.

Headroen's Bush Lima.—Valuable on account of extreme earli-

ness. Extremely productive, tender and delicious. The dry beans are small and white.

Beets

Runkelreuben, Ger. Remolacha, Sp. Betterave, Fr.

One oz. to 100 ft. drill, 5 to 6 lbs to the acre, in drills.

A rich, deep, light soil is particularly necessary for a successful growth of beets. For early supply, sow very early in spring, soon as ground can be worked in drills 18 inches apart, 1 inch deep and thin to 4 inches in the row. For autumn and winter crops, sow later in the season. When young the leaves make excellent greens.

If wanted very early, sow such sorts as Crosby's Egyptian and Detroit Dark Red in hotbeds and transplant, cutting off the outer leaves. For general crop, sow in freshly prepared soil as soon as the ground will permit, about an inch deep and pressing the soil firmly over the seed. When the plants are well established, thin out. For winter use the turnip varieties may be sown in June so as to mature late in the season. The roots are stored in a cellar and covered with sand or sandy soil to prevent wilting, or they may be kept outdoors in pits such as are used for apples and potatoes.

Three Varieties

Albani.—One of the best, extra early beets in cultivation; very sweet and tender; fine for home and market garden use.

Eclipse.—Very early and especially desirable for the home garden, roots nearly globular, with a small tap root; flesh bright red.

Edmund's Blood Turnip.—Very uniform; roots always smooth, round and handsome; top small of good marketable size and among the best for table use; color dark red; crisp, tender and sweet; good keeper.

Borecole, or Kale

One ounce will produce 3,000 plants.

To grow this valuable winter vegetable successfully, it is important that the soil should be deep, well worked, and liberally manured. Sow about the middle of April in prepared beds, covering thin and evenly; plant out in June, following directions recommended for cultivating cabbage.

Three Varieties

Dwarf Green Curled.—Very dwarf, spreading variety. Leaves beautifully curled, quite hardy; will remain over winter where the temperature does not fall below zero.

Dwarf-Brown.—Same as Dwarf Green, but dark purple.

Siberian, or Sprouts.—One of the best known varieties of kale, also called sprouts or German greens. The green curled leaves are tender and of delicate flavor.

Broccoli

Nearly allied to the cauliflower, but more hardy. The seed should be sown in the early part of May and transplanted in June south, the sowing should be delayed until June or July, and the transplanting accordingly from August to October. In parts of the country where the thermometer does not fall below 20 or 25 degrees broccoli may be had in perfection from November until March. It succeeds best in a moist and rather cold atmosphere.

Two Varieties

White Cape.—Heads medium size, close compact, and of creamy white color. One of the most certain to head.

Purple Cape.—Differs only in color.

Brussels Sprouts

This is one of the best vegetables for winter use, producing from the axis of the leaves an abundance of sprouts, resembling small cabbages, of excellent, mild flavor.

Two Varieties

Tall French.—Very fine.

Dwarf Improved.—A variety producing compact sprouts of excellent quality.

Cabbage

Konl, Ger. Chou, Fr. Berza, Sp.

One oz. will produce 1,500 plants. ½ lb. to transplant for an acre.

Culture.—For plants of the earliest sorts sow seed in January or February under glass, and prick out in flats or frames about 2 inches apart each way. Transplant to open ground as soon in spring as the land can be properly prepared. A rich, warm, fibrous loam is best. Have the plants in the rows 20 to 24 inches apart, and rows at least 2 feet apart. Give thorough cultivation, and irrigate in dry weather if practicable. Protect against the ravages of cutworm, maggot and green worm. A little nitrate of soda applied around the plant is of great benefit. Potash applications, such as wood ashes or muriate, may also do much good. For late cabbage plants, sow seed in drills in open ground during April and May, and transplant in June and July, giving the plants more room than allowed for earliest cabbages. Dusting with tobacco dust, insect powder, etc., or splashing with hot soap-suds, especially whale-oil soap solution, are good and safe remedies for some of the insect pests attacking plants of the cabbage.

Early Varieties

Copenhagen Market.—A new variety from Denmark, which matures as early as Wakefield. Heads weigh 10 to 12 pounds and are very solid. It is the latest of the

Forty Varieties of Garden Vegetables. How Plant and Cultivate

early round-head varieties, and of excellent quality.

Small Extra Early Jersey Wakefield.—The earliest strain of Wakefield cabbage, very hardy, and may be set out early. Heads small, but very solid.

Volga. One of the earliest main crop cabbages of superior quality. Very desirable where a large, uniformly round head with short stem and compact growth is wanted. Matures very early for a variety furnishing such large heads of excellent shape. Very hardy, good keeper.

Early Drumhead.—A second early, sure heading cabbage of good quality. Plant of compact growth. Head large, thick, flattened on the top, solid, crisp and tender.

Red Cabbage

Red Bellefleur.—Medium size and late. Most delicious of all red varieties.

Early Red Dutch Erfurt.—Earlier than the Red Drumhead, but equally as valuable for pickling.

Red Dutch Drumhead.—A large, long variety, fine for pickling. **Manumoth Rock Red.**—The largest and most solid of the Red varieties; a sure-heading sort and tender.

Carrot

Moehren, Ger. Zanahoria, Sp. Carotte, Fr.

One oz. 100 ft. drill; 3 lbs. per acre

For early crops, sow as soon as ground can be worked, in drills 1 inch deep and 1 foot apart (3 feet for field culture), thinning 4 to 8 inches, according to varieties. Keep your plants well cultivated. Under favorable conditions 600 bushels per acre is a fair crop. The carrot, being enormously productive and of superior nutritive quality, is a desirable and profitable crop to grow for stock feed.

Carrots do best in warm, deep, rather light and fairly fertile soil, that is well supplied with humus, or on strong loam having been in clover and broken the year before. For earliest crop sow seed of the early short-rooted sorts in April or May, in drills a foot apart, and thin to 2 inches. For main crop, sow in May or June, or for succession even in July, using the longer-rooted varieties. The rows for these may be 16 to 20 inches apart, and the plants thinned to 2, 3 or even 4 inches. To raise carrots for stock, the rows may be made wide enough apart, say 2 to 2½ feet, to allow of cultivation by horse power. In sowing carrot or other small seeds, especially during dry weather, pains should be taken to firm the soil well over the seed, either by means of the feet or with the roller of the garden drill.

Three Varieties

Chantenay.—Tops medium sized, necks small; roots tapering slightly but normally stumpy rooted and smooth; color deep orange-red; flesh very crisp and tender. Although this is a medium early sort, it furnishes roots of usable size as early as any, is a heavy

cropper, and is undoubtedly one of the best for both the market and private garden, while its great productiveness makes it very desirable as a field sort.

Long Orange.—The most popular of the other sorts for firm use on mellow soil. An improvement obtained by years of careful selection of the best formed and deepest colored roots.

Victoria.—Largest carrot grown, heaviest cropping and most nutritious variety cultivated, roots remarkably fine, light orange; symmetrical, excellent quality of high feeding properties; good keeper. Heavy cropper on all soils, best adapted for rich land, grows half as much weight again per acre as ordinary sorts, grows well out of ground, easily harvested. All who have cattle should raise a quantity of carrots for feeding with cows in winter. It crosses the flow of milk and goes to the butter a delicious flavor and a rich golden color. Breeders of fine horses feed carrots to help keep them in health and condition.

Cauliflower

Blumen Kohl, Ger. Chou-fleur, Fr.

One ounce of seed for 3,000 plants

Cauliflower succeeds well in any soil where cabbages will grow. It delights in a rich soil and plenty of water. For early sorts, sow in a hotbed in February or March; for later crop, sow in May in a moist place. Transplanting should be done in moist weather.

Three Varieties

Extra Early Dwarf Erfurt.—Best for forcing, good for open ground, Dwarf and very solid, with short outside leaves. Can be planted 20 inches apart each way and forced. Almost as early as Snowball.

Barnard's Snowball Cauliflower.—For main crop, and for every purpose except for first early, or for culture under glass (for which the Extra Early Dwarf Erfurt is excellent) growers recommend Barnard's Snowball as a variety of the highest quality and reliable, sure cropping strain.

Vaughan's New Snowball.—This is an excellent strain of this popular vegetable, the superior of which cannot be found. In size, compactness and color it represents quality of the highest type. A well grown head will measure 9 or 10 inches across and have depth in proportion, very solid, and the core will be perfectly white.

Celery

Sellerie, Ger. Aplo, Sp. Celeri, Fr. 1 oz. to 2,000 seeds.

Celery delights and thrives best in a muck land, but can be grown in any good garden soil. Sow the seed in the open ground early in spring, as soon as ground can be worked.

Prepare the soil well, and sow in drills a quarter inch deep and about 10 inches apart, taking care to firmly press the soil over the seed.

When 2 inches high, after careful hardening, transplant to 2 inches apart each way. Later dig trenches 4 feet apart and 6 inches deep, or 7 may be set on level ground, as when large enough trim off the tops (to render stocky) and enough of the roots to admit of straight planting, and set in trenches 6 inches apart, covering to the crown only.

Other Directions.—For first crop seed early in hotbeds, or in pots in the house. In rich moist soil, covering seed very lightly. For main crop sow in open ground in April, or soon as soil is in good condition. Seed germinates slowly and if the weather is hot and dry protect with light covering of hay or straw. Stir soil as soon as plants are well up, thin out and transplant so that they stand about an inch apart in the row. If they grow too rapidly, shear the tops off when about 4 or 5 inches high, and this will make them more stocky. For main crop set plants out between June 15th and July 15th, in rows 3 feet apart, and plants 6 inches apart in the row. Care should be taken to firm the earth well around plants when setting and they will root better. Keep clear of weeds until about the middle of August, when it will be time to begin earthing up. Do the soil up against plants as high as closely as possible, firming it enough to keep plants in an upright position. Later in the season the blanching process must be finished by digging soil from between rows and banking clear to the tops on each side of the row of celery. Much labor is saved by growing the self-blanching varieties. They are later to grow but do not do quite so well.

Three Varieties

White Plume.—Stalks, portions of the inner leaves and heart naturally white, become fit for use by simply tying up closely with soft twine. More used than any other by gardeners.

Golden Self-Blanching.—By far the most popular sort on the market. It is of medium earliness, dwarf, compact habit, with thick, solid, heavily ribbed stalks, which blanch easily to a clear waxen yellow. When grown in rich, moist soil, the stalks are numerous and large, with a solid heart of beautiful yellow.

Rose-Ribbed Self-Blanching.—Is a sport from the Golden Self-Blanching, having all its good qualities, with the additional attraction of beautiful rose-tinted ribs, making it very handsome.

Celeriac

(Or Turnip-Rooted Celery)

Knollen Sellerie, Ger.

Celeri-rave, Fr. A plo nabo, Sp.

A turnip-shaped, tender, marrow-like variety, possessed of more pungent taste and odor than the common sorts. Keeps well, and is principally used for flavoring meats and soups.

A popular German vegetable worthy of more extensive cultivation. The roots, which are used in salads or boiled like parsnips or turnips, have a celery flavor that

Forty Varieties of Garden Vegetables. How Plant and Cultivate

is particularly pleasant to those who like celery. These roots keep well all winter. Celeriac is deserving of much more popularity.

Three Varieties

New Celeriac "Delicatessen."—Produces perfectly smooth oval roots, without any side roots, and never rots. Flesh is pure white, tender and of the best quality of all varieties of this vegetable. This size does very well on light soils.

Giant Prague.—This is unquestionably the largest and best celeriac for main crop, and is the most popular with American growers. The roots are very large, almost twice the size of Erfurt, almost globe-shaped, smooth, and with only a few roots at the bottom. The flavor and quality are excellent. The common kinds of celeriac one sees while marketing are often small and crooked, with a mass of unsightly and useless roots. The Giant Prague averages very regular in shape and has few side roots. It is a general favorite.

Earliest of All.—This is a variety ready in June. Flesh pure white and very tender; roots of good size, fine quality and never woody. Foliage short and tubers remarkably smooth. On account of its earliness may be planted for succession as late as July.

Chicory

Kaffee wurzel, Ger.

One ounce of seed for 100 feet of drill

Sow one-half inch deep, in drills, one foot apart and cultivate like carrots.

The dried roots are used for mixture with coffee, or as a substitute. The young leaves make excellent greens, and are preferred by some even to the dandelion.

Two Varieties

Large-Rooted Magdeburg.—The roots are cut in thick slices, roasted and used for coffee. The leaves in spring also make a good salad.

Witloof Chicory or French Endive.—This European delicacy has in the past few years become a standard salad in all of the best American hotels and restaurants. It can be easily grown by any one. Seed is planted in the spring and roots like parsnips are produced. The roots are stored in sand until wanted for growing on during the winter. They are then forced in soil in some deep place.

Citron

Wassermelone, Ger. Sandia, Sp.
Melone d'eau Pastèque, Fr.

One oz. to 30 hills, 4 to 5 lbs. in hills to an acre.

The culture of the citron is very similar in all respects to that of the musk varieties. Being hardier and of much more vigorous habit, however, it may be planted before settled warm weather appears, in hills not less than 8 feet apart, and thinned to two vines per hill. If melons of largest size are the object, remove all but a few when quite small.

Collards

Well adapted to the southern climate, where it is extensively used. It is a species of cabbage, highly esteemed for its delicious flavor.

Seed may be sown in the extreme south from early fall until late spring. The plant is quite hardy. Plants may stand 8 inches apart. Treat as cabbage.

Corn

Sweet or Table Varieties

One quart for 200 hills. One peck for acre in hills.

A rich, warm, alluvial soil is the best, but excellent sweet corn can be raised on any good, ordinary soil, if it is deeply and thoroughly worked before planting. In the north sweet corn should be planted as early as can be done without risking great loss from frosts or from rotting of the seed in the soil.

If planted in rows, make the rows about 4 feet apart and place the seed 14 to 16 inches apart in the row, covering one inch deep with fine soil firmly pressed down.

If planted in hills, make the hills for the early varieties 3 feet apart each way and plant 6 kernels to the hill. For the later sorts the hills should be not less than 4 feet apart each way. Hoe frequently, and when 6 inches high thin so as to leave 3 or 4 plants in the hill. Give frequent and thorough but shallow cultivation until the tassels appear. For succession, plant every two weeks until late summer.

Three Varieties

Stowell's Evergreen.—This standard main crop variety excels all other late sorts in sweetness and productiveness. It is more popular than any other for canning, for marketing and for the home garden. Great care has to be exercised in the selection of stock to grow seed from, as this variety has a tendency to deterioration and a shorter grain, which makes it less sugary and desirable.

Mammoth Sugar.—A large, late variety, having ears of mammoth size, 14 to 20 rows. Quality excellent, not exceeded by any variety. A good canners' variety, being white grained and very uniform. A week later than Stowell's Evergreen.

Early Evergreen.—The ears of this new corn grow 8 inches long, are mostly 14 to 18 rows. This is a magnificent find for market gardeners and for main crop in every home garden. It ripens 10 to 12 days in advance of Stowell's Evergreen and is equally as good for all purposes. The kernels are very sweet and tender, and when eaten from the cob break off free from husky tips so common to some otherwise fine table corns.

Corn Salad

A small, quick growing salad plant for late fall, winter and spring use. The leaves are used

as a substitute for lettuce and spinach.

During August and September sow the seed in shallow drills about one foot apart, covering with about one-fourth inch of fine soil firmly pressed down. On the approach of severe cold weather, cover with straw or coarse litter. The plants will also do well if the seed is sown very early in the spring, and, like most salad plants, are greatly improved if sown on very rich soil; indeed, the ground can scarcely be made too rich for them.

Cress

Brünnenkresse, Ger. Cresson de Fontaine, Fr. Berro, Sp.

One ounce will sow 150 feet of drill

A popular salad which should be sown early in the spring, very thickly in shallow drills, and at short intervals, for succession, as it soon runs to seed.

This is a well-known hardy perennial, aquatic plant, growing abundantly along the margins of running streams, ditches and ponds, and sold in immense quantities in our markets in spring. Where it does not grow naturally, it is easily introduced by planting along the margins of ponds and streams, where it increases, both by spreading of the roots and by seedling. It has a particularly pleasant, pungent taste, agreeable to most people.

Two Varieties

True Water.—Sow seeds along the border of running water.

Upland Cress.—A perennial variety; hardy, produces well; same flavor as water cress. Grown on high, dry land; does not run to seed rapidly.

Cucumber

Gurken, Ger. Concombre, Fr. Pepino, Sp.

One ounce will plant fifty hills; two pounds will plant one acre

Culture.—For very early cucumbers, sow April 1st, in a hotbed upon pieces of sod (grass side down), so that they can be readily transplanted to the open ground, in rich soil, when danger of frost is over, or protect by hand-glasses. For early use, plant, if the weather has become settled and warm, in hills 4 to 6 feet apart each way; thin out to four of the strongest plants to each hill, after all danger from insects is over. They succeed best in a warm, moist, rich, loamy soil. Continue planting at intervals for a succession. The cucumbers should be gathered when large enough for use, whether required or not; if left to ripen, it destroys their productiveness. For pickles, plant from June until the middle of July.

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Forty Varieties of Garden Vegetables

HOW TO PLANT AND CULTIVATE EXPLAINED ELSEWHERE IN THIS VOLUME



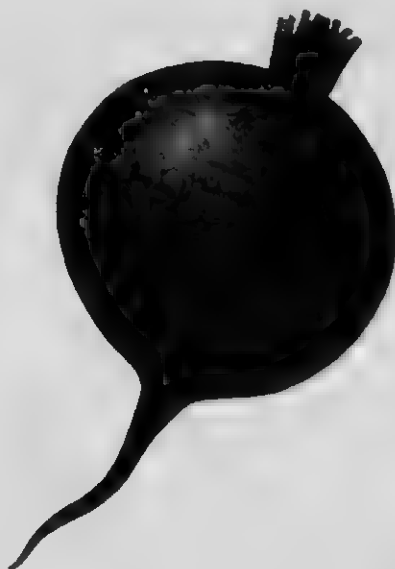
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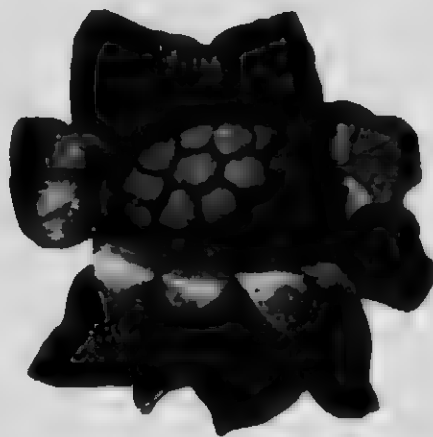
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BORECOLE OR KALE



BROCOLI



BRUSSELS SPROUTS



CABBAGE

Forty Varieties of Garden Vegetables

HOW TO PLANT AND CULTIVATE EXPLAINED ELSEWHERE IN THIS VOLUME



CARROT



CAULIFLOWER



CELERY



CELERIAC

Forty Varieties of Garden Vegetables

HOW TO PLANT AND CULTIVATE EXPLAINED ELSEWHERE IN THIS VOLUME



CHICORY



CITRON



COLLARDS



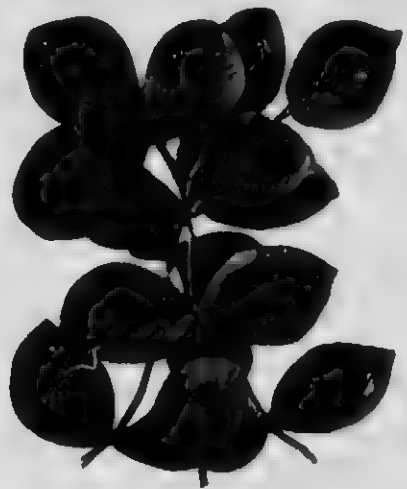
CORN

Forty Varieties of Garden Vegetables

HOW TO PLANT AND CULTIVATE EXPLAINED ELSEWHERE IN THIS VOLUME



CORN SALAD



CRESS



CUCUMBER



DANDELION

Forty Varieties of Garden Vegetables

HOW TO PLANT AND CULTIVATE EXPLAINED ELSEWHERE IN THIS VOLUME



EGG PLANT



ENDIVE



GOURD



HERBS

Forty Varieties of Garden Vegetables

HOW TO PLANT AND CULTIVATE EXPLAINED ELSEWHERE IN THIS VOLUME



KOHL RABI



LEEK



LETTUCE



MUSKMELON

Forty Varieties of Garden Vegetables

HOW TO PLANT AND CULTIVATE EXPLAINED ELSEWHERE IN THIS VOLUME



MUSTARD



OKRA



ONION



PARSLEY

Forty Varieties of Garden Vegetables

HOW TO PLANT AND CULTIVATE EXPLAINED ELSEWHERE IN THIS VOLUME



PARSNIP



PEAS



PEPPER



PUMPKIN

Forty Varieties of Garden Vegetables

HOW TO PLANT AND CULTIVATE EXPLAINED ELSEWHERE IN THIS VOLUME



RADISH



RHUBARB



RUTABAGA



SALSIFY

Forty Varieties of Garden Vegetables

HOW TO PLANT AND CULTIVATE EXPLAINED ELSEWHERE IN THIS VOLUME



SQUASH



TOMATO



TURNIP



WATERMELON

Forty Varieties of Garden Vegetables. How Plant and Cultivate

The yellow-striped cucumber or squash beetle is the most serious insect enemy of this crop. Bordeaux Arsenate of Lead Mixture is by far the best remedy yet discovered. Dilute it with water, 3 ounces to the gallon, and spray it on the vines when in danger of the beetle or blight.

Two Varieties

The Davis Perfect.—For a number of years this variety was controlled by the originator, who states that he experimented several years in trying to get an improved strain of cucumber for forcing under glass and outside culture. The cucumbers grow long and slim, sometimes measure 12 inches in length; the color is a rich dark, glossy green, which they hold until nearly ripe. It is very tender, brittle, and of fine flavor.

Overbearing.—This is a valuable variety, producing pickles and cucumbers until frost kills the vines. It is very productive, fruits of all sizes will be found on the vine at same time, size is small and well adapted for pickling.

Dandelion

One ounce will sow 150 feet of drill

In spring the blanched leaves of this plant make a most delicately flavored and wholesome salad. The seed may be sown in May or June, in drills half an inch deep, and 12 inches apart, thin out the plants to 6 inches; cultivate during summer and the following spring the leaves will be fit to cut. The quality is improved by blanching, which can be done by covering with leaves or other loose litter, or by placing a large inverted flower pot over each plant.

Two Varieties

Improved Thick-Leaved.—A very early, large-leaved variety, common.—A popular sort for greens and salads.

Egg Plant

Eierpfanze, Ger. Aubergine, Fr. Berengena, Sp.

One ounce will produce 1,000 to 2,000 plants

Culture.—Sow the seeds in hot-beds early in March. When 3 inches high pot the young plants, using small pots, and plunge them in the same bed, so that the plants may become stocky. They can be planted out from the pots when the season becomes sufficiently warm, in May or June. Egg-plant seed requires a higher temperature for germination than any other garden vegetable, and this temperature should be maintained right along in order to maintain strong and healthy growth. The soil can hardly be made too rich. After settled warm weather has set in, set the plants in open ground, al-

lowing 3 feet space between rows, and 12 feet space between the plants in the row. Watch for the potato beetle. This pest as well as blight may be controlled by spraying with Bordeaux Arsenate of Lead Mixture.

Three Varieties

New York Improved Large Purple.—This variety is largely grown and produces the egg plants in great quantities, as the plants bear from 6 to 8 fruits each. They are large, nearly round, dark purple, free of thorns and of excellent quality.

Early Long Purple.—Earliest and hardiest, very productive, fruit 6 to 10 inches long.

Black Pearl.—Fruit purplish-black, round, large, solid, smooth and glossy, very prolific and early.

Endive

Endive, Ger. Chicoree, Fr. Endibia & Escarola, Sp.

One ounce of seed to 300 feet of row

Endive is one of the best and most wholesome salads for fall and winter use. Sow in shallow drills in April for early use or for late use in June or July. When 2 or 3 inches high, transplant into good ground or thin out to 1 foot apart. When nearly full grown, and before they are fit for the table, they must be blached. This is done by gathering the leaves together and tying with yarn to exclude the light and air from the inner leaves, which must be done when quite dry, or they will rot. Another method is to cover the plants with boards or slats. In three or four weeks they will be blached.

Two Varieties

Green Curled Winter.—Standard sort for fall and winter crop, when tied up this variety blanches splendidly.

White Curled (Self-blanching.)—Leaves pale green, grows to a large size, always crisp and very tender.

Gourds

Sow in the garden, in late spring, after the ground has become warm. The plants are tender, requiring the same culture as squash or melon. Should be sown where they are to grow, as they do not transplant easily.

Two Varieties

Japanese Nest Egg.—Grows almost uniformly to the size, color and shape of a hen's egg. The shells are hard and make the very best of nest eggs, as they do not crack. The largest ones, when sawed in two, make excellent pots for starting tomato, strawberry and other plants.

Dipper.—Makes a lighter and more convenient dipper than can be bought. Dippers of various sizes of a capacity from a pint to a quart and a half, can be had from a few vines.

Curious Vegetables

The Iowa Seed Company, located at Des Moines, Iowa, suggests that exhibitors at agricultural fairs will aid in making the fair interesting by showing something new in vegetables unlike what the neighbor grows, including mixed peppers, gourds, kale, endive, egg plants, brussels sprouts, kohi-rabi, okra, borecole, cross, dandelions, corn salad, chicory, celeriac, parsley, nasturtium, mustard and other plants not generally grown. Several of these are found in the list of vegetables shown in this volume.

Herbs, Sweet, Medicinal and Pot

The cultivation of herbs is very simple, and but little care is needed beyond keeping down the weeds. Sow in April or May, in drills 12 to 15 inches apart, and thin out the young plants where they stand too thick. Gather when just coming into bloom, tie in small bunches and dry in the shade.

Varieties marked with an * are perennials.

Anise.—Used for seasoning and garnishing.

***Balm.**—Leaves used medicinally.

Basil, Sweet.

Borage.—Leaves are used as a salad.

Catnip.—Good for * pasture.

***Caraway.**—Seeds used medicinally and in bread.

***Culander.**—Seeds used for flavoring.

Dill.—Leaves used with pickles, seeds for flavoring soups and vinegar.

Fennel.—Seeds for flavoring; leaves for garnishing.

Hops.—Used in making beer.

***Horseradish.**—Has medicinal qualities.

Hyssop.—Used in medicine.

***Lavender.**—Its flowers are used in the manufacture of oil and distilled water.

Marjoram, Sweet.—Used for seasoning.

Rosemary.—Leaves used for seasoning.

Mint.—For soups, etc.

Rue.—Cures roup in poultry.

Saffron.—Used for coloring.

Sage.—Leaves are used in stuffing and sauces.

Savory, Summer.—Used for seasoning.

***Thyme.**—For seasoning.

Tobacco.—For smoking.

***Wormwood.**—Beneficial for poultry.

Kohi-rabi

One ounce will sow 200 feet of drill

This vegetable, the popularity of which is rapidly increasing, combines the virtues of the turnip and cabbage, but excels both in nutri-

Forty Varieties of Garden Vegetables. How Plant and Cultivate

tive, hardy and productive qualities. The seed may be sown in June, in rows 18 inches apart, and the plants thinned out to 8 or 10 inches.

Two Varieties

Short Topped Early White Vienna.—The most desirable variety for forcing and early outdoor planting. Fine for table use.

Large White Vienna.—A large late variety, which remains tender longer than any other sort.

Leek

This belongs to the onion family. Leaves flat; stems very large, cylindrical, bulbous.

Sow early in spring in drills 12 to 15 inches apart, covering one-half inch deep. Thin plants to 6 inches apart in row and draw the earth about them when cultivating.

If one desires very white and tender leeks, transplant when about 6 inches high, setting 4 inches apart in trenches about 2 feet apart, and gradually earth up like celery.

Three Varieties

London Flag.—This variety is hardy, of good quality, and is extensively cultivated in this country.

Large American Flag.—A variety similar to, but larger than, the London Flag, and very popular. One ounce of seed to 150 feet of drill. This is the sort chiefly grown by market gardeners. It is of excellent quality, mild flavor and uniform.

Monstrous Carentan.—The very largest variety, often three inches in diameter, and becoming very white and tender. A very hardy and desirable sort, which is worthy of more extensive cultivation.

Lettuce

Lattich, odor Garten-Salat (Ger.), Laitue (Fr.), Lechuga (Sp.)

One ounce will produce about 3,000 plants

Culture.—Sow the seed in hot-beds or flats during February or early March, prick the young seedlings out in flats or coldframes, several inches apart each way, and, as soon as a nice, rich, warm spot can be prepared in open ground in spring, transplant the well-hardened plants in rows a foot apart, allowing 8 to 12 inches space between the plants in the row. For succession sow seed thinly in open ground, and thin the plants to 5 or more inches apart. Sow for succession every few weeks until the fall. Some varieties do well in a cool forcing house during winter.

Two Varieties

Early White Cabbage (White Butter Lettuce).—A good variety for sowing in the fall, as it is nearly hardy and requires but little protection. Heads are very firm and nicely bunched.

Black-seeded Tennisball.—Forms a close, hard head, with few outer leaves.

Musk Melon

One ounce will plant 75 hills

Cultivate in hills, which should be 5 to 6 feet apart each way, and composed of light, moderately rich soil. The hills should be dug about 2 feet square, 18 inches deep, and half filled with well-rotted manure, which must be thoroughly incorporated with the soil. Plant in May, 10 seeds to the hill, and when the plants are well up, thin out to three. Cultivate until the vines cover the ground, and pinch the ends of the growing shoots to induce early fruiting.

Three Varieties

Miller's Cream, or Orange.—A remarkably fine variety of large size and delicious flavor. The flesh is deep salmon color and very thick. A great favorite for the market and home garden.

Rocky Ford.—A very popular small melon, of a most delicious flavor.

Extra Early Hackensack.—The fruit is medium-sized, nearly round, and very thickly netted; flesh light green, of delicious flavor.

Mustard

Mustard is not only used as a condiment but the green leaves are used as a salad or cut and boiled like spinach. Sow as early in the spring as the ground will permit, in drills about eighteen inches apart, covering one-half inch deep. For succession, sow every few weeks till autumn. Water freely. In the South the seed may be sown in autumn and the plants used early in the spring as a salad and for greens.

Two Varieties

Ostrich Plume.—Leaves long, ruffled, frilled and curved gracefully as an ostrich plume; desirable for garnishing. Can be cut quite early; excellent for "greens."

Southern Giant Curled.—True curled leaf variety so popular in the South for planting in fall to furnish early spring salad; also fine for spring sowing.

Okra, or Gumbo

Esabarer Elbisch (Ger.), Gombaud (Fr.), Quimbombo (Sp.)

Culture.—This vegetable is extensively grown for its green pods, which are used in soups, stews, etc., to which they impart a rich flavor, and are considered nutritious. Sow the seed thickly in rich ground, about the middle of May, or when the ground has become warm, in drills 3 feet apart, 1 inch deep; thin to 10 inches apart in drills. Culture otherwise much like corn.

Two Varieties

Perkins' Long-Pod Okra.—An exceedingly handsome variety of okra, which is a great improvement upon other varieties heretofore grown. The pods grow 4 or

5 inches in length and are very tender, long, slim and of a beautiful deep green color. The habit of growth of plant is dwarf, and it is very productive.

Dreer's Little Gem.—The best of the dwarf sorts. It makes a stocky growth of plant and is very productive. The pods are long, slender and of a light green color.

Onions

One ounce of seed for 200 feet of drill; four to five pounds for an acre

The onion is most successfully grown in a rich, sandy loam. Continued cultivation upon the same plot of ground, contrary to the general rule, rather improves the crop than otherwise.

As early as the ground can be worked in the spring, sow the seed in drills 14 inches apart, covering half an inch. When the plants first appear in the rows, commence hoeing, just skimming the surface. Subsequently, weed thoroughly and carefully by hand. When the tops die, pull the onions and spread evenly over the ground; stir or turn until thoroughly dried, then cut the tops off one-half inch from the bulb. Winter in a frost-proof place.

Globe onions are preferred by some growers to those of any other shape. Such onions do not occupy any more space in the row; their size and solidness make them weigh out and measure more, and their attractive appearance finds for them ready sale in nearly all markets.

Two Varieties

Barnard's Yellow Globe.—This is a superb onion for all classes of soil (well enriched) on account of its quick maturing qualities, and especially good for muck lands. The onions from this strain of seed ripen early and all at once. They are distinct and perfect in shape, with very small necks; handsome, bright, even color. The firm solid bulbs are all that can be desired in size and quality. Being excellent winter keepers, they are sought in all onion markets.

White Globe.—One of the most beautiful globular, mild flavored onions. A favorite for market; salable everywhere. It is of very large size, and of fine quality.

Onion Sets

For early onions for bunching: ready for table in a very few weeks. It is cheaper to grow from seed but considerable work to weed, and many prefer to buy sets.

Four Varieties

Potato Onion Sets.—A species of Multiplier onion, increasing from bulb early; matures quickly; mild.

White Multiplier Onion Sets.—Pure silvery white; frequently producing as many as twenty bulbs in a single cluster; excellent quality; very early

Forty Varieties of Garden Vegetables. How Plant and Cultivate

Red Top Sets.—Commonly known as Button onion sets. **Perennial or Winter Sets.**—Also called Egyptian or Tree onions. Usually set in fall; produce earliest spring onions without winter protection. Do not make large bulbs.

Parsley

Petersille (Ger.) **Persil** (Fr.). **Peregil** (Sp.)

Culture.—Used for garnishing and seasoning soups, meats, etc. Succeeds best in a mellow, rich soil. Sow thickly early in April in rows 1 foot apart and $\frac{1}{2}$ inch deep, thin out the plants to stand 6 inches apart in the rows. The seed is slow of germination, taking from three to four weeks to make its appearance, and often failing to come up in dry weather. To assist its coming up quicker, soak the seed a few hours in warm water, or sprout in damp earth, and sow when it swells or bursts. For winter use protect in a frame or light cellar.

Three Varieties

Dreer's Summer Green.—Well adapted for growing during the hot summer months. It holds its color late.

Dwarf Extra Curled Perpetual.—Leaves tender, crimped and very curly, of a bright green color.

Fern Leaved.—A fine-leaved variety, excellent for garnishing.

Parsnip

Pastinake (Ger.), **Panais** (Fr.)

One ounce will sow about 150 feet of drill

The value of the parsnip as a culinary vegetable is well known but is not generally appreciated at its full value for stock feeding. On favorable soil it yields an immense crop of roots, more nutritious than turnips and very valuable for dairy stock.

Parsnips are usually grown on deep, rich, sandy soil, but will make good roots on any soil which is deep, mellow and moderately rich. Fresh manure is apt to make the roots coarse and ill shaped. As the seed is sometimes slow and uneven in growth, it should be sown as early as possible in drills two and one-half feet apart; cover one-half inch deep and press the soil firmly over the seed. Give frequent cultivation and thin the plants to six inches apart in the row.

One Variety

Hollow Crown or Gherney.—An excellent variety for the table. Roots long, with smooth white skin, uniform in shape, tender and of the best quality. The variety is easily distinguished by the leaves growing from the depression on top or crown of the root.

Garden Peas

Erbesen (Ger.), **Pois** (Fr.), **Chicaros o Ginsantes** (Sp.)

One quart will plant about 100 feet of drill. One and one-half to two bushels for an acre.

Culture.—Peas of extra early, smooth class are the very first thing to be planted in the garden in spring. The wrinkled sorts follow a little later, as they are not quite so hardy. Tall late varieties need brush or other support. By selecting sorts that do not grow much over two feet high, the necessity of providing brush may be avoided. Judicious selection of varieties and planting frequently for succession will give us a full supply of the choicest green peas almost during the entire season, with the possible exception of the hottest part of the summer. Open furrows three or four inches deep and three feet apart; scatter the seed peas into them and cover with hoe or plow. Cultivate like corn or beans. The late tall sorts may be planted in double rows and brush stuck in between for support. All garden peas, however, require good, strong and fertile land. Heavy yields cannot be obtained on poor soil. The very dwarfest sorts of the American Wonder type will succeed only on the very richest garden land, and may be planted in rows a foot apart.

Extra Early Varieties

Ferry's First and Best.—The earliest and most even strain of white, extra early peas, maturing so well together that sometimes a single picking will secure the entire crop. Vines vigorous and hardy, of medium height, about two and one-half to three feet, bearing three to seven straight pods of good size, about two and one-half to two and three-fourths inches long, each containing five to seven medium sized, smooth peas of fair quality.

Early Morn.

Market Surprise.

Mutton's Green Gem.

The Leader.

Pepper

Pfeffer, Ger. **Piment**, Fr.

It will require one ounce of seed for 1,500 plants

Peppers are indispensable as a seasoning for soups and meats. The large varieties are mainly used for the purpose, and for pickling. The mild, sweet varieties, like Golden Dawn and Ruby King, are used for mangoes, while the small-fruited sorts are best for sauces.

Peppers are more tender than most vegetables. The seed should be sown in a hotbed, cold frame, or if no other convenience a box in the window, and transplanted about the last of May. They can

be sown in the open ground when the weather becomes warm and settled. Warm, mellow soil, well fertilized, should be used.

Two Varieties

Chinese Giant Pepper.—This desirable variety is undoubtedly the largest sweet pepper ever offered. The flesh is quite thick, very mild and remarkably sweet.

Giant Crimson.—This new pepper is of upright growth, and produces fruits nearly as large as Chinese Giant. It ripens early and is very mild.

Pumpkin

Grosse-Kürbis, Ger. **Potiron**, Fr. **Calabazas**, Sp.

One ounce of seed for 25 hills, three pounds for an acre

Culture.—Sow in good soil in May, when the ground has become warm, in hills 10 feet apart each way, or in fields of corn about every fourth hill; plant at the same time with the corn. Pumpkin varieties if planted together will mix. There is not much danger of their mixing or hybridizing with squashes or other vines.

Two Varieties

Winter Luxury Pumpkin.—A very good keeper and a splendid pie pumpkin; shape round, skin finely netted, and beautiful russet-yellow color, flesh thick and of fine flavor.

Sugar, or New England Pie.—For making pies this variety cannot be excelled. The pumpkins are small, but very sweet, fine-grained and of the best quality. The skin is a deep orange and flesh rich yellow.

Radish

Radischen, Rottig (Ger.), **Radis**, Rave, Petite Rave (Fr.), **Rabana** (Sp.)

One ounce of seed will grow 100 feet of drill

Culture.—Sow early and often. In good, warm, fibrous loam, especially if quite sandy, summer radishes will make a crop in 4 to 6 weeks from sowing. The soil should be well prepared, and fertilizers may be used freely. Have the rows a foot apart, and sow just seed enough so they will not require thinning. Any little spot that becomes available during summer may be utilized for planting radishes. The short or turnip-rooted sorts are quickest and easiest to grow, and good for forcing also. On greenhouse bench or in frames the rows need not be more than 4 inches apart. Sow winter radishes in July and August. They grow best in the cooler autumn weather. Take them up before severe freezing and store in sand in the cellar, or in a pit, where they will keep tender and crisp all winter.

Forty Varieties of Garden Vegetables. How Plant and Cultivate

A Profitable Crop.—Farmers' boys can make money easily and very quickly by sowing an ounce or two of radish seed. It is surprising how many bunches can be sold at five cents each from the little garden plot. Only four to five weeks required from sowing to selling. Try it and see.

Five Varieties

New Perfection.

Cardinal Globe.—Those who like the crisp little red radishes that come so early will be pleased with this variety. The radishes grow globular in shape, and are of a most brilliant cardinal-red color. It will stand considerable heat; therefore it is a quick forcer, and the quality is fine, being crisp and tender. It is by far the best variety for forcing, and also does well in open ground.

Early Bird.—Decidedly the earliest of radishes. Quick growth is one of the main essentials for a crisp and tender radish, and with loose soil and proper culture the Early Bird is ready for the table in twenty days from the time of sowing the seed, which makes it one of the most desirable sorts ever offered for either forcing or outdoor culture. It is of round or turnip shape as shown in our illustration, of bright scarlet color and pure white flesh, which is tender, crisp and of the very best flavor. It has few and short leaves, which admits of very close growing, thus producing a large number of bundles of radishes on the same ground. Very desirable for the home garden and money maker for the market gardener.

Early Scarlet Gem.—An extremely early variety which has matured fit for the table in seventeen to twenty days from the time of sowing the seed and is fully grown in less than four weeks. It is of a perfect globe shape, and of a bright, rich scarlet color, tipped with white, thus making it particularly handsome on the table.

Rhubarb

Rhabarber (Ger.), Rhubarbe (Fr.),
Ruibarbo (Sp.).

One ounce of seed to 125 feet of drill

Culture.—Good plants are easily grown in any good garden soil. Sow seed thinly in shallow drills a foot apart, thin to 4 or 5 inches. Keep soil loose and free from weeds. The plants are liable to vary considerably. Pick out the strongest and best. In fall or spring following, transplant to the permanent bed, four feet apart each way, in deep, warm and very rich soil. The more manure the better stalks. For winter forcing take up two-year roots in fall, leave out to freeze, then bed close together on cellar bottom or under greenhouse bench in the dark.

Two Varieties

Linnaeus.—Early, large, tender and very fair.
Large Victoria.—A very large, late variety.

Rutabagas

Largely grown in the north for stock feeding, and for this are superior to turnips. Sow not later than June in drills two feet apart and thin out to eight inches in the row.

Four Varieties

American Purple Top.—Deep purple above, yellow underneath, flesh yellow, solid and sweet. Good for stock or table use.

Monarch.—A superior variety to cultivate for cattle feeding, the flesh being nutritious.

Skirving's Purple Top.—Flesh yellow. Good keeper.

White Swede or Russian.—Grows very large; excellent for table or stock; flesh firm, white, solid, has a very rich and sweet flavor.

Salsify

Or Vegetable Oyster

Hafer-Wurzel (Ger.), Salsifis (Fr.),
Oatlen Vegetal (Sp.)

One ounce for 50 feet of drill

Used the same as carrots, or, after having been boiled, made into cakes and fried like oysters, which they resemble in flavor.

Culture.—Cultivate the same as carrots or parsnips; it is hardy; can remain in the ground all winter for early spring use, but should be taken up before it starts growing; take up a supply for use during the winter. Succeeds best in a light, well enriched, mellow soil. Sow early in the spring in drills 12 to 15 inches apart, 1 inch deep; thin, if necessary, to 6 inches apart.

Two Varieties

Mammoth Sandwich Island.—This variety of salsify grows to a very large size, and resembles a good-sized parsnip. It is very mild and delicately flavored, and very popular.

Long White.—A favorite market variety and fine flavored.

Squash

One of the most nutritious and valuable of garden vegetables. The summer varieties come to the table early in the season, while the fall and winter sorts can be had from August until the following spring. The winter varieties are very well adapted for stock feeding and we heartily recommend them for that purpose.

Squash plants are very tender and sensitive to cold and so planting must be delayed until settled warm weather. General methods of culture are the same as for cucumbers and melons, but squash is less particular as to soil. Summer varieties should be planted four to six feet apart each way and winter sorts eight to ten. Three plants are sufficient for a hill. In gathering the winter sorts care should be taken not to bruise or break the stem from the

squash, as the slightest injury will increase the liability to decay. Winter squashes should be stored in a moderately warm, dry place and the temperature kept as even as possible. For those who desire very early squashes, seed can be planted in boxes, and transplanted.

Insect pests that attack the vines when small, such as the striped beetle, may be kept off by frequent dustings with air-slaked lime, soot, or sifted ashes diluted with fine road earth. For the large squash bug, the best remedy is a kerosene emulsion.

Five Varieties

No. 1, True Hubbard; No. 2, Blue Hubbard; No. 3, Warted Hubbard; No. 4, Red Hubbard.

Bellefleur.—This fine squash has proved to be a most desirable new winter variety. Color of the skin is green, with an occasional blue specimen, about the same size as the Hubbard, weighing 5 to 10 lbs. Has very thick flesh, cooks dry and is of superior flavor. Although a good fall variety it is in its best condition during the winter.

Early Prolific Marrow.—Early and productive, the two most important features for the market gardener, while its attractive color—brilliant orange red—good cooking and keeping qualities, make it popular with consumers.

Tomatoes

Liebesapfel (Ger.), Tomato (Fr.),
Tomate (Sp.)

Use one ounce of seed for 1,500 plants; one-fourth pound to transplant for an acre

The tomato is very easy to grow as an outdoor crop, requiring little or no expert knowledge. Any fairly enriched garden soil will produce good specimens. For the early crop the seed is usually sown about March 1, in shallow boxes, in a greenhouse, a hotbed or a sunny window where the temperature ranges from 65 degrees at night to 80 degrees in the day. The seed should be covered about one-fourth of an inch. When the plants are about 1 inch high, transplant into boxes of soil 3 inches deep, the plants 2 inches apart, and keep at an average temperature of 60 degrees, where they may remain until time for planting in the field. If a few plants are grown for home use and early fruit is desired, then shift the necessary number of plants into 4-inch pots when the plants are about 6 inches high, using a very rich soil. By this method strong, stocky plants may be had for planting out about May 20, which is as early generally as it is safe to do it. Should the thermometer fall below 40 degrees at night after planting, cover the plants with plant protectors, taking them off in the morning when the thermometer is above 40 de-

Forty Varieties of Garden Vegetables. How Plant and Cultivate

greens. A very rich soil is not desirable for tomatoes, as, if too rich, the fruit does not set as early or as bountifully as in a moderately rich soil; however, there should be a fair coat of well-rotted stable manure spread on the soil and plowed or dug under prior to setting the plants and then thoroughly harrowed. Take the plants from the boxes with the least disturbance of the roots possible. With an ordinarily loose soil in the boxes, the plants can be pulled apart without breaking many roots, but take the entire contents of the boxes out first, using a spade for that purpose; this renders it easier to accomplish. Plant in rows 3 to 4 feet apart and the same distance in the rows. All the now remains to be done is hoeing and cultivating occasionally, allowing no weeds to grow. In garden culture supports for the vines are desirable. The simplest way to train the vines is by driving a stake, say 6 feet long by 2 inches square, about 4 inches from each plant, which, when 1 foot high, should be tied loosely to the stake with some soft twine, and thus continue to tie at intervals of 1 foot as the plants grow. Grow to a single stem and cut off all superfluous side shoots at intervals. During the season cut out all growths which exclude sunlight from the fruits; it will repay the trouble taken to do it. To grow the large specimens all that is necessary in addition to the method just described is, plant the "Ponderosa" or "Crimson Cushion." When the fruit begins setting pinch off all fruits excepting 3 or 4 on each vine. At this period give two or three liberal applications of some reliable garden fertilizer for vegetables, at intervals of two weeks, hoeing it well into the soil. Very large, handsome specimens can be grown in this way. The late summer and early fall crop is often grown by sowing the seed about May 10 in land carefully prepared and properly enriched, in hills 3 or 4 feet apart. It is customary to drop from 8 to 12 seeds in a hill and when about 6 inches high, thin out to one plant in each hill, taking care to keep hills free from weeds. The cultivation used for this crop is the same as employed for the early crop.

Five Varieties

Ponderosa.—The Giant Tomato.—This is the largest-fruited tomato and is of fine quality for eating. The vines are of strong growth; fruits largely oblong in form, deep through, and generally ridged or ribbed; deep purple in

color. They are solidly fleshy, with small seed cells, of fine sweet flavor. Planted in good soil, pruned to a single stem, fruits frequently attain a weight of one pound or more.

Tall Champion Tomato.—An unusually strong, rank grower and a heavy bearer. The fruits resemble the Dwarf Champion in color and smoothness, although they run a little larger in size. Fair average size of the fruit is 2½ inches thick and 3¼ inches broad. Very hardy. It is also extremely prolific and certainly one of the most desirable sorts for the private garden and market use.

Two Peach Tomatoes.—They resemble a peach in shape and color. They are eaten raw or preserved. Each red or yellow.

Yellow Plum.—The fruits average 2 inches in length and 1 inch in diameter, of a bright lemon-yellow; are solid, fleshy and of excellent flavor.

Henderson's "Tenderloin" Tomato.—A sturdy, healthy grower; it ripens its first fruits immediately following those of the early sorts, and from that time until frost it is practically ever-bearing, yielding enormous quantities of tomatoes.

The fruit is borne in clusters of from 4 to 6; the individual fruit, 4 to 5 inches in diameter, run remarkably uniform in size and shape, being almost round, solid, and weigh about 1 lb. each; the surface is smooth, never cracks and the rich glossy crimson color permeates the flesh to the heart; it ripens thoroughly to the stem.

Turnip

Steckrübe (Ger.), Navet (Fr.), Nabo Coman (Sp.)

Allow one ounce of seed to 150 feet of drill; sow one to two pounds per acre in drills

Turnips do best in highly enriched, light, sandy or gravelly soil; commence sowing the earliest varieties in April in drills, from 12 to 15 inches apart, and thin out early to 6 or 8 inches in the rows. For a summer crop, sow at intervals of a fortnight until the last week in May for early crop, and from August to September for late. August sowings may be made for the fall and main crops. Turnips may be preserved until spring by cutting off the tops about 1 inch from the bulb and storing in a cellar or cool shed during winter, covering the roots with dry sand; they should be harvested before severe frosts set in, for, though comparatively hardy, few of the varieties will survive the winters of the Northern States in the open ground.

Four Varieties

White Milan.—Earliest of all turnips. Best quality in its class. Fine snowy white color. The skin is smooth and neat as if polished. Foliage is short. Medium size. Flesh white, tender and smooth

grained. Can be used spring or fall.

Purple Top Milan.—(See Illustration.)—Almost in season with White Milan, the earliest; size medium; shape flat; skin very smooth. Surface color is white with a purple white top. White flesh, excellent quality. Very even in growth.

Early Purple Top, Strap Leaved.—This is a popular early variety, week or so later than Milan, favorite for table use. Flat like a broad disc in shape, medium size. Purple or dark red above ground, white below. Flesh white, fine-grained and tender, leaves few, entirely upright in growth. A good keeper.

Early White Flat Dutch.—Early garden variety, largely used in Southern states. Medium size, flat white, very early; sweet and tender, desirable for table use, but spongy and inferior when overgrown.

Water Melon

One ounce of seed is required for 40 hills; three pounds will plant an acre

A light, sandy soil, with good exposure to the sun, is the best for watermelons. It should be prepared deep, but receive shallow cultivation. Hoe often and thoroughly. Plant in hills 8 to 10 feet apart each way. Plant 8 to 10 seeds in a hill, and finally, when danger of insects is past, leave but three strong plants.

Four Varieties

Cole's Early.—Decidedly the finest variety for the private garden, but is too brittle for long shipments. It is very early and will mature earlier north than most other sorts. Of medium size, very productive, continuing to bear throughout the season. Flesh of bright red color, of granulated, sparkling appearance. In flavor lusciously sweet and refreshing. One of the best early melons and is specially valuable for growing for home market, as it matures in advance of other sorts and is the form and color that recommend it to buyers.

Fordhook Early.—Large early sort. From seeds planted May 10, ripe melons have been produced the last of July. The rind is tough, making it valuable for shipping. Color is uniform medium green; flesh red, very sweet, solid, and of excellent quality. In markets where a solid green color is preferred the Fordhook will be a favorite.

Kolb's Gem.—For many years a favorite sort among Northern market growers. On account of its excellent shipping qualities it is extensively grown for that purpose. Nearly round; color a dark green with lighter narrow stripes. Very thin rind; flesh bright red, good flavor.

Long Lighteling.—An old standard variety, still highly regarded by market growers. It is a melon of splendid quality with the attractive bright red flesh so desirable. The fruits are large, oblong in shape, with light colored rind, making it distinctive.

ONE HUNDRED VARIETIES OF FAVORITE FLOWERS

How to Plant and Cultivate

BLOSSOMS IN COLORS SHOWN ON FOLLOWING PAGES

Abronia

Umbellata

Trailing plants with verberna-like flowers; long green oval leaves and fleshy stem lying prostrate on the ground. Very fragrant and a long time in bloom. Half-hardy annual, 6 to 18 inches high.

Culture.—Remove the husk from the seed before planting and transplant to a foot apart. They may with profit be started in a hotbed or frame and transplanted to any desired situation. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Acroclinium

Helipterum Roseum

This is one of the most beautiful of the everlasting flowers. It is of strong growth and bears a great number of pink and white daisy-like flowers. Should be picked the first day they open to secure a bright center when dried. 18 inches high. Annual.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Adonis

Pheasant's Eye

Plants with fine graceful foliage and brilliant flowers, remaining in bloom throughout the summer. Delight in a shaded position. Hardy annual, 1 foot high.

Culture.—Seeds should be planted in the autumn, as they will stand the winter well, and they are a long time in coming up. If started in-doors, young plants can be transplanted to the open as soon as warm weather appears.

Ageratum

Conyzoides

A very beautiful Mexican flower of a delicate, brush-like appearance; very attractive in the garden. They bloom all summer, and if sown in fall will give winter bloom under glass. Keep a foot apart. Annual, 1½ feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. The soil should be well pulverized and rich.

Alyssum

Maritimum

A low-spreading, light green plant with small white flowers of a peculiar delicate fragrance. Most effective in masses of plants 1 foot apart. Hardy annual. Grows 1 foot high.

Culture.—Sow out of doors after danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Amaranthus

Candatus

Foliage brilliantly ornamental, producing a striking effect in the border, as a background, or as centerpiece for beds, and is the peer of variegated-leaved plants. Annual. Should be thinned to 3 feet apart. Two to 3 feet high.

Culture.—Seeds should be sown early in a warm hot-bed; when started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Ampelopsis

A well-known, popular climbing plant, clinging to any surface and growing to a height of 30 to 50 feet. Foliage beautiful in autumn. Plant early in spring in hot-bed and transplant when well established to the place where it is to grow.

Antirrhinum

The antirrhinum, perhaps better known by its old and popular name, snapdragon, is an old favorite border plant. Succeeds best in dry, loamy soil. Tender perennial, 2 feet high.

Aster

The aster is considered the queen of all fall flowers. For beauty and variety of form and color it is unrivaled, and of all flowers is best adapted to win the admiration of all lovers of floral beauty. Set a foot apart. Height 1½ feet. Annual.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich well-pulverized, garden soil should be prepared for them.

Bachelor's Button

Centauria Cyanus

Old-fashioned, but one of the most popular. Its slender branching stems bear enormous heads of bright flowers, which bloom until frost and come up in the spring from self-sown seed. Annual, 1 foot high.

Culture.—To get good plants for setting out, seed should be sown in January or February, in window boxes or greenhouse. Young plants can be transplanted to the open as soon as warm weather appears.

Balsam

Lady Slipper

An old and favorite garden flower, producing its gorgeous masses of beautiful, brilliant-colored double flowers in the greatest profusion. Half hardy annual, 2 feet high.

Culture.—Careful growers never use seeds less than three years old. Plant in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather comes.

Balsam Pear

Charantia Balsamina

Very curious, rapid and dense climber with ornamental foliage. Its large, golden yellow fruit opens when ripe and displays its brilliant blood-red inside. Hardy annual, 10 feet.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Bartonia

Bartonia Aurea

Bartonia aurea is a very showy, half-hardy annual from California. The leaves are somewhat thistle-like in appearance, gray and downy. The flowers are of a very bright metallic yellow and exceedingly brilliant in the sunshine. It likes considerable moisture.

Begonia

One of the leading and most beautiful window plants. Are of easy culture and produce a profusion of elegant flowers. Seeds are fine and require care in sowing.

Succeeds best with greenhouse culture, and needs to be grown in loam, peat and sand mixed.

How Grow One Hundred Varieties of Favorite Flowers

Browallia

A favorite, profuse-blooming plant covered with beautiful flowers during summer and autumn until frost. In transplanting keep a foot apart. Annual, 1½ feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in window-box or hot-bed, transplant into similar boxes when the seedlings have formed two or three leaves. They may be finally transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Cacalia

A very pretty and showy plant with flowers borne in clusters on slender stalks about a foot in height. They keep in bloom from early summer until autumn, furnishing flowers for cutting every day. Annual, 1½ feet high.

Culture.—Can be grown readily from seed sown where the plant is wanted to grow, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Calendula

Officinalis

(Pot Marigold)

One of the easiest grown, brilliantly showy, and free-flowering plants, producing a fine effect in beds or borders. Blooms all the time; fine for cut flowers. Hardy annual, 1 to 2 feet high.

Culture.—Sow the seeds out of doors, in a rich soil, after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears.

Calliopsis

Or *Coreopsis*

Showy and free-flowering plants, blooming all summer and excellent for cutting and massing. Annual, 1 to 2 feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Canary Bird Vine

Tropaeolum Peregrinum

A beautiful climber, the charming little canary-colored blossoms bearing a fancied resemblance to a bird with its wings half extended. Grows to a height of 20 feet. Annual.

Culture.—Seeds should be started in-doors, young plants can be transplanted to the open as soon as warm weather appears, and

placed near some trellis or other support, which they will soon cover.

Candytuft

Hardy

A handsome, compact-growing plant and considered the best spreading dwarf plant with white flowers. Now developed in tints of pink and blue. Well adapted for permanent front rows of borders, clumps or beds. Few hardy plants will give as much satisfaction as this little gem.

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in a summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Canna

Stately plants with foliage of elegant growth, presenting a luxurious and tropical appearance. Much employed in ornamental planting, and are very effective planted in clumps. Height 3 to 5 feet. Annual. Keep a foot apart.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Soak seed thoroughly in warm water before planting. The roots can be kept in the cellar over winter.

Canterbury Bell

Campanula Medium

This old-fashioned flower is a favorite with all. A free bloomer with flowers large and bell shaped. Borne on stately stalks. One to 4 feet high. Biennial. Thin to 12 inches apart.

Culture.—The seed should be planted early in spring, in open ground, and will blossom before fall. The plants will bloom again the following year, but the young plants bloom best and seed should be sown every spring.

Carnation

Marguerite

These are a comparatively new class of carnations. They are highly prized for massing in summer beds, and their perfect form, beautiful shades of color and lavish profusion of bloom continue till frost, or continue in-doors. Semi-dwarf, 10 to 15 inches high. Annual.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Catchfly

Silene Armeria

An easy growing, free-flowering plant, producing dense clusters of blossoms. The plant is covered with a glutinous moisture from which flies cannot disengage themselves, hence the name. Hardy annual, 1 foot high.

Culture.—Sow out of doors when danger from frost is over. They can also be sown in shallow boxes (2 inches deep) in the green-house, hot-bed or light window of dwelling, if desired early, and transplanted to flower beds at the beginning of warm weather.

Celosia

Feathered

Annual plants of tropical origin and one of the most showy for garden decoration. Half hardy; should not be sown till warm, settled weather. Of easy culture.

Centranthus

The flowers of the centranthus are small, borne in clusters on light green, transparent stems. They form beautiful masses or borders, and for cutting, for bouquets or other floral work are excellent. Annual, 1 to 2 feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Chrysanthemum

These showy and effective garden varieties are extensively grown for cut flowers. The foliage is ornamental and finely cut. They grow 16 to 18 inches high and blossom in fall. Annual.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. If possible plant in a warm, sheltered spot, since they will bloom up to November.

Clarkia

A very bright and attractive flower which is a great favorite in England. Blossoms are borne on long, graceful sprays and are especially valuable for cut flowers, as all the buds open in water. Hardy annual, 1½ to 2½ feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

How Grow One Hundred Varieties of Favorite Flowers

Clematis

These flowering vines are universally admired for their quick growth, fragrance and superb blossoms; fine for trellises, arbors, and rockwork. Transplant in the open ground in early summer. Hardy perennial.

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Mixed Climbers

A mixture of many varieties of climbing plants which will produce the most gorgeous effect. When the space to be planted is limited this will save expense in purchasing so many varieties. Plant in spring where they are to remain; the soil should be rich and deep.

Clintonia

Hardy annual. Dwarf growing plants for summer use of all shades of color. Well suited for rockwork, etc. Six inches.

Cobaea

Scandens

A fine climber with handsome foliage and large, bell-shaped flowers. Always clean of insects. Place seed edge down. Grows 15 to 20 feet. Annual.

Culture.—Seeds should be sown in March, in light, rich soil, over gentle heat, a sunny window with south or southeast exposure is excellent. The seedlings potted in small pots and when about a foot high planted out of doors.

Cockscomb

Celosia Cristata

Highly ornamental plants producing crested heads of flowers somewhat resembling a cock's comb. Plenty of moisture and frequent transplanting is important. Should be 3 feet apart. Half-hardy annual, 1 to 2 feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Coleus

The elegantly marked leaves of the coleus are now familiar to all, and are seen in almost every bed of ornamental-leaved plants. To have fine plants by the last of May, seed should be sown during

March or early in April, in shallow boxes of rich soil, in the sunny window of a warm room, and the young plants grown in pots as soon as they are large enough to transplant from the seed-boxes.

Columbine

Aquilegia

One of the most popular perennials, easy of cultivation and flowering from early summer until frost. Very desirable for borders and groups among shrubbery. One to 3 feet high.

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Convolvulus

Minor

Dwarf Morning-glory

This is a dwarf species of the old-fashioned morning-glory. Of trailing habit, each plant covering about 2 feet. Very useful for low trellises or rockwork. Hardy annual, 2 feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Cosmos

Compositae

None of our autumn flowers are more prized than these graceful and brilliant garden plants. It has long stem and feathery foliage, and continues to blossom in fall till freezing weather. Four to 5 feet high. Annual. Keep at 18 inches apart.

Culture.—Seeds may be planted in the open ground in the autumn if the young plants can be protected during the winter. If started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Dahlia

In the Dahlia are combined more desirable qualities than almost any flower grown in open ground. Produces blossoms of every color and combination from early summer till frosts, and is unsurpassed as a cut flower. Half-hardy perennials growing from 4 to 6 feet.

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Datura

Trumpet Flower

Very large, showy, branching plant bearing large trumpet-shaped flowers about the size of a calla lily and having a faint perfume. Grow about 3 feet high. Hardy annual. They need lots of room, at least 2 feet each way.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Dianthus

Or Pinks

A great variety of rich, brilliant colors, shades and markings; plants in bloom constantly from early summer till after severe frosts. Twelve to 18 inches high. Annual.

Culture.—Sow seed out of doors after danger from frost is past. For early flowering seedlings can be started in-doors; young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Double Daisy

Bellis Perennis

Charming little plants for pots, borders and edgings. The flowers are abundant during the spring and continue blossoming all summer. Height about 6 inches. Keep about 6 inches apart. Perennial.

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Eschscholtzia

California Poppy

A most popular garden flower, very attractive as an edging because of its bluish foliage. It stands considerable cold and blooms after the first frosts, but does not bear transplanting well. Height 10 to 20 inches. Hardy annual.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Forget-Me-Not

Myosotis Alpestris

The forget-me-not is an old favorite plant, bearing clusters of star-shaped, delicate blue flowers. Plants 3 to 6 inches high. Hardy perennial.

How Grow One Hundred Varieties of Favorite Flowers

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Four O'Clock

Mirabilis Jalapa

A very handsome, erect, bushy, quick growing herb, bearing very profusely in late summer and fall. The flowers open in cloudy weather or late afternoon and close in the morning. Two feet high. Annual.

Culture.—The seeds should be planted in May where they are to grow. Or if started under glass they may be transplanted out of doors in May along with dahlias. In the late fall their tuberous roots should be taken up for planting the next year.

Fox Glove

Digitalis

A very beautiful and interesting old-fashioned plant whose culture is very simple. The bell-shaped flowers borne on long spikes make an exceedingly handsome and stately border. Keep plants 2 feet apart. Height 3 to 5 feet. Hardy biennial.

Culture.—The seed should be planted early in spring, in open ground, and will blossom before fall. The plants will bloom again the following year, but the young plants bloom best and seed should be sown every spring.

Fuchsia

Well-known plants of easy culture in pots for parlor or conservatory decoration, or in the open border; easily grown from seed. The seed is very fine and needs careful handling. Sow in finely prepared soil and transplant afterwards.

Gaillardia

The flowers are some 2 or 3 inches across, semi-globose, dense, and therefore very showy. It is a valuable and beautiful addition to the hardy border flowers. Good bedding annuals. Constant bloomers. Set plants 12 to 18 inches apart.

Geranium

Pelargonium

These universally admired plants are easily grown from seeds and bloom the first season. Their brilliancy and succession of bloom, together with their marking, make them so valuable for either beds or pot culture. Half hardy perennial, 1 to 2 feet high. Will not winter out of doors in the northern states.

Culture.—Easily grown from slips but seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Gladiolus

Gladiolus, Different Sorts

For best results they should have a sunny position, a loam suits them best, but they do equally as well in clay if there is perfect drainage. Well-rotted stable manure is a good fertilizer, and where convenient it should be spread over them in the fall, and dug in the following spring. Sheep manure is an excellent substitute, and can be applied in the spring. The time to plant is about the first of May, putting in the small bulbs first, and reserving the larger bulbs for later planting. A succession of bloom may be had from July to October by having plantings two weeks apart up to the end of June. To have a good show they should be planted from three to four feet apart each way. The depth to plant is regulated by the size of the bulb, the large bulbs being covered about six inches, the smaller ones from three to four inches.

After they have flowered and the foliage begins to turn yellow, which is usually along about the beginning of October, lift the bulbs, cutting off the stems, placing them in trays or shelves in an airy cellar or some such place, where the temperature will not fall below 45 degrees, or rise over 60 degrees. In such a position they will keep perfectly until time for resetting the following season.

They are very effective in lines or beds or when planted among Roses, Peonies, Shrubbery, etc.

Globe Amaranth

Gomphrena Globosa

Everlasting Flower

An excellent everlasting, or immortal, flowers globe shape, purple, orange, and variegated. Retain their shape and color when dried; are also good for cutting as fresh flowers. Height, 18 inches.

Culture.—Sow in boxes, in a warm place; soak the seed in warm water a few hours before sowing, transplant to one foot apart.

The flowers should not be picked for drying until they are fully matured the last of summer.

Godetia

A beautiful new variety; the plant of neat, dwarf, compact habit, with a profusion of rich

carmine-crimson flowers, produced in a succession of bloom through the summer, until frost.

Culture.—Sow in finely prepared soil, in the garden, late in spring, transplant into good soil, about eight inches apart.

Gypsophila

Height one foot

Small, white, fragrant flowers, borne on long, feathery stems. No flower adds more of light and grace to a bouquet than this, and when once grown, will be found indispensable. In bloom through the summer from the first of July till frost. Although not belonging to the immortal class, the flowers dry finely, and are very desirable for winter bouquets.

Culture.—Sow in open ground, early, and transplant to six or eight inches apart, in common soil.

Helichrysum

Ornamental in the garden and desirable for winter bouquets.

Heliotrope

A well-known and popular plant, fine for bedding, vases and baskets, and exquisite for pot culture in winter. Flowers borne in racemes and exceedingly fragrant. 6 to 18 inches high. Half-hardy perennial.

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Hibiscus

Tall growing branching plant of the easiest culture with handsome foliage and large bell-shaped flowers, measuring from 5 to 7 inches across. Blossoms all season. Height 4 to 5 feet. Keep a foot apart. Annual.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Hollyhock

Althea Rosea

The hollyhock is an old garden favorite. The tall stately spikes bear immense quantities of blooms of the most brilliant colors and, in the double variety, they are as double as a rose. Plant 3 feet apart and water freely. Height 5 to 6 feet. Hardy perennial. A row of hollyhocks makes an attractive screen to shut off an undesirable view or along a fence.

How Grow One Hundred Varieties of Favorite Flowers

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Honeysuckle

French

A beautiful hardy perennial plant, grown in borders about 3 feet in height. The flowers are red and white.

Hyacinth Bean

Dolichos Lab-lab

A splendid climber, with hyacinth-like clusters of flowers which are followed by exceedingly ornamental seed pods. Is of rapid growth and stands heat well, but not the cold. Half-hardy annual, 10 to 20 feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Ice Plant

Mesembryanthemum Crystallinum

A very pretty trailing plant that has fleshy, wax-like leaves which have the appearance of being covered with ice crystals. Start in-doors. Annual. 6 inches high.

Culture.—Sow in a light soil in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

English Ivy

Hedera Canariensis

An old popular and excellent variety for cultivation in the house, being a free grower and very beautiful; broad, glossy green leaves. For indoor winter decoration the Ivy is unequalled, as it can be trained in any desired form, and will bear any amount of hardship and bad usage. The Ivy is not quite hardy for the North, but plants that have done service in the garden all summer can be taken up in the autumn and potted for the house. In the spring the plants can be transferred to the garden by just sinking the pots in the earth. In the autumn they are ready for service in the house again, and better than ever.

Japanese Hop

Humulus Japonicus

An unusual beautiful variety of rapid-growing climbing vine. Leaves deep green, beautifully

striped with silvery white. Reaches a height of 15 to 20 feet in remarkable short time. Annual.

Culture.—Seeds should be planted out of doors only after all danger of frost is over, or if started in green-house, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Lantana

Popular and rapid growing plants with large heads of variously colored and perfumed flowers. The bushy plants are completely loaded with blossoms which are succeeded by green berries which turn to a deep blue when ripe. Half hardy perennial. 2 feet high.

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Larkspur

Delphinium or Hardy

A most deservedly popular plant in the hardy border and garden. The bold attractive spikes make a splendid appearance. There is no hardy perennial more easily raised and grown.

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Lilies

Lilies thrive best in a dry, rich soil. They should be planted deep, 4 to 6 inches, as they form two sets of roots, one below, the other above the bulb. It is well to protect them with a covering or litter of straw.

Lily of the Valley

The well known and beautiful white sweet scented flower. Hardy.

Linum

Linum grandiflorum rubrum.

Distinguished for their brilliant-colored flowers, which are deep crimson with black center, saucer-shaped, and very conspicuous in beds and border. The foliage of the plant is slender and delicate, and the flowers produce very little seed. If the seed be sown in hot-bed and the plants transplanted into good rich soil, one foot apart, the period of flowering will be much advanced, but the seed can be sown in open ground after the weather is warm. Hardy annual, 1½ feet high.

Lobelia

Exceedingly pretty, profuse blooming plants, useful both in the garden and for hanging baskets, window boxes and vases, or edgings and beds. About 6 inches high. Annual.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Lupin

Perennials

Very desirable garden plants, showy and excellent for cuttings. Graceful spikes 2 feet high in various colors. Annual.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Lychnis

Lychnis Chalcidonica

Few plants produce as bright flowers and bloom as continuously as *Lychnis*. For massing in beds and borders it has no equal. Hardy perennial. In transplanting keep 1 foot apart, 2 feet high.

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Marigold

Tagetes Erecta, African

These old fashioned favorites are hardy annuals of the easiest culture. A beautiful plant forming a globular compact bush covered with rich, golden, double flowers. Especially fine in mixed borders. Height 3 feet. When transplanting keep 6 inches apart.

Culture.—Seeds should be planted in the open ground after all danger of frost is over; if desired early, start in window-box; plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Maurandia

Barclayana

Height Five to Eight Feet

An elegant climbing, greenhouse perennial, but can be grown from seed, and brought forward so as to branch and flower profusely from middle of summer till frost, the first season, in the garden. One of the most popular climbers for piazza decoration.

How Grow One Hundred Varieties of Favorite Flowers

Culture.—Sow early, in-doors; transplant to open air late in spring. The plants produce a profusion of rich purple, rose, etc., fox-glove-shaped flowers, with abundant foliage, through the season till frost.

Mignonette

The mignonette is a universal favorite and no other flower is so generally known for fragrance. The dense semi-globular heads of flowers are borne on stalks about six inches high making the whole plant reach 1 to 1½ feet. Hardy annual.

Culture.—Seeds may be sown out of doors at any time after danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Ipomoea (Moon Flower)

Tall growing annual climbers, related to the family of Morning Glories. As Moonflower plants have dense foliage, they are useful to cover trellis work, verandas, etc. Plant seed out-of-doors when warm weather sets in. Soak them first.

Morning Glory

Convolvulus Major

One of the most free flowering and rapid growing annual climbers thriving in almost any situation. Its delicate flowers are very brilliant and beautiful with a wide range of tints and markings. Annual. Supply a support early, use either wire, cord, or trellis. Height 10 to 15 feet.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or for early blooming plants may be started in-doors and transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure, is best.

Soak seed in warm water for an hour or two to hasten germination.

Mourning Bride

Scabiosa

One of our handsomest summer border plants, producing in great profusion very double flowers in a great variety of shades and colors. Excellent subjects for cut flowers, lasting nearly a week after being cut. Thin to 6 inches apart. Hardy annual. 1 to 2 feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. The soil should be rich and well pulverized.

Musk Plant

Mimulus Moschatus

The musk plant is grown for its scented foliage and pale yellow flowers; is of trailing habit and makes a fine showing in hanging baskets. Plenty of moisture and a shaded position is important. Perennial with trailers about 9 inches long.

Culture.—Seeds may be sown very early in spring, so plants will blossom in fall, or started in late summer, so that good, healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Nasturtium

Tropaeolum Minus

The Dwarf or Tom Thumb Nasturtiums grow about 1 foot in height and very compactly and are used for beds, borders, and massing. They thrive under all conditions and always make fine displays of rich brilliant flowers. Annual.

Culture.—Sow in drills about an inch deep, in light rich soil, when all danger of frost is over, and train the Tall on trellises or over fences, and the Dwarf in beds or to make borders for the beds.

Nicotiana

A most striking, bushy, much branched plant, literally ablaze with blossoms from base to summit; deliciously sweet fragrance. Thrive in a hot sunny position. 2 to 4 feet high. Half hardy annual.

Culture.—Seeds should be planted in shallow boxes of light soil in-doors, young plants can be transplanted to the open as soon as warm weather appears; they may also be sown out of doors after danger from frost is over.

Nigella

Love-In-a-Mist

Nigella Damascena

A popular old fashioned flower, with finely-cut foliage surrounding the curious looking flowers and seed pods. Makes pretty edgings for walks or borders. Hardy annual. 1 foot high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure is best.

Pansy

These lovely flowers are favorites with all, not only for the brilliancy and variety of their colors, but for the durability of their bloom. Seed may be sown in open ground in spring or summer, or in hot-bed early in spring.

Young plants produce the largest and best flowers. The plants should always occupy a cool, partially shaded situation, and the ground cannot be too rich; coolness and moisture are necessary. Transplant when an inch high. Seed sown in early summer will blossom late in autumn; if sown in fall will blossom the following spring. Hardy biennial, 4 inches high.

Passion Flower

Hardy Passion Vine

A beautiful climbing vine producing peculiar shaped flowers. Perennial.

Peonies

There is no hardy perennial which equals the Peony in beauty and usefulness. Once planted, the plants and flowers increase in size and beauty with age. They are as hardy as oaks and as handsome (many as fragrant) as roses. When the plants are through blooming they are as handsome and ornamental as most of the hardy shrubs. The plants are practically immune from insects. We would advise our readers to beware of "cheap" Peonies. An inferior variety will take as much care and space as a choice one, and the first cost of a Peony is nothing compared to the disappointment after years of waiting.

Planting.—An important point to observe is not to plant too deeply. The roots should be placed so that the crowns (or eyes) are covered with two or three inches of soil. Planting too deep is often the cause of shy blooming.

Plant with southwest or west exposure, as early as possible in the spring as they sprout very quickly.

Small—divided roots, 3-5 eyes.
Medium—1 and 2 years from division.

Large—4 and 5 year old clumps.

Petunia

Petunias are unsurpassed if indeed equalled for massing in beds. Their richness of color, duration of bloom and easy culture will always make them welcome and popular. 1½ feet high. Hardy annual. Transplant 18 inches apart.

Culture.—Seeds should be planted in the open ground only after danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure is best.

Phlox

Star Shaped

For a splendid mass of color and a constant display, the Phlox is unequalled. These flowers differ from the Phlox drummondii in their long pointed petals, giving

How Grow One Hundred Varieties of Favorite Flowers

a star like appearance. Plant, compact and dwarf, 8 inches high. Annual.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure is best.

Pink

Hardy Annual

Some of the colors are various tints of rose, maroon and purple, richest velvety crimson, beautifully fringed varieties, vivid crimson lake, etc., etc.

The Pinks belong to the same class as Carnation, Sweet William, etc., but, unlike them, bloom the first season; very effective in beds or borders; flowers very double, of remarkably rich colors and mark ings.

Culture.—Sow seed in garden in spring, when the ground has become warm; thin, or transplant when 2 inches high to 4 inches apart.

Poppy

Papaver

The marvelous development of these old-fashioned flowers has made them deservedly popular. The individual flowers are large and elegant, with crinkled petals which appear in the sun like crumpled satin. Grow $\frac{1}{2}$ foot in height. Annual.

Culture.—Seeds should be sown in the open ground as early in the season as practicable, in beds of well pulverized soil. The plants should remain where sown, as they do not easily stand transplanting. Thin out carefully so as to disturb the remaining plants as little as possible.

Portulaca

Double rose-flowered, seven different colors, crimson, rosy purple, white rose, striped with carmine, orange, yellow. The double varieties of this charming plant are most beautiful and should be in every flower garden. The blossoms are perfectly double, about the size of a silver dollar, and the colors are white, yellow, scarlet pink striped, etc.; a bed of them in bloom presents a gay appearance. Select a light and sandy soil, with a full exposure to the sun; they will stand any amount of dry, hot weather. Sow after the ground is warm, in beds or masses. Tender annual; 9 inches high.

Evening Primrose

Oenothera Biennis

Beautiful low growing plant producing numberless blossoms borne in spikes. The flowers are fully expanded only towards and during the evening. Annual 2 feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure is best.

Primula

Japanica

A beautiful and profuse flowering plant of free, vigorous growth with dark green foliage, and large flowers in a variety of color. Blooms early in summer. Plenty of moisture is needed. 1 to 2 feet tall. Annual.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich friable loam is preferable.

Pyrethrum

Feverfew

Parthenium

A very fine hardy plant with stems about 2 feet high, surmounted with handsome flowers in the brightest shades. In bloom a long time and are splendid as cut flowers. Hardy perennial.

Culture.—Seed may be sown very early in spring so plants will blossom in fall or started in late summer so that good healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Ricinus

Castor Oil Bean

Mixed Colors

Grown as single specimens and on lawns and pleasure grounds, they form a striking feature.

Tall, majestic plants with leaves of glossy green, brown or bronzed-metallic hue, and long spikes of prickly capsules of scarlet and green. An elegant plant for a lawn, and of very quick growth in rich soil. Plant in hot-bed, and transplant when three leaves have formed, or plant where they are required. Tender annual; 8 to 10 feet high.

Roses

More than two hundred varieties of Hybrid Perpetual Roses are listed by one of the largest nurseries in the United States, and the number is constantly being increased. Many well-known favorite Roses of this class safely endure the winter south of Philadelphia, but are not sufficiently hardy for the western and north-western latitudes.

Roses should be planted in the spring just as soon as the ground can be worked, and carefully handled as they are plants that need

attention when planted. Select a good sunny location where the soil is well drained, and should the soil be heavy or clayey, some sand should be put with it. A good plan is to take out the soil from 18 inches to 2 feet deep, and in the bottom place from 10 to 12 inches of well-rotted cow manure and sod, then place the black earth that was taken out, on top of this.

Culture.—In planting Dormant Roses (nearly all of which are grafted plants) care should be taken to have the budded part set two or three inches below the surface of the ground, and the soil pressed firmly about the stem. Dormant plants produce better flowers and make stronger plants than those grown from cuttings. Plant fifteen to eighteen inches apart.

Before winter sets in the bushes should be covered, and the best method is to dig a small trench close to the plant, by setting a spade 8 to 10 inches back of the plant and pushing it into the ground about 10 inches, cutting off the roots, then push the plant bodily into the trench and cover same with building paper three or four thicknesses, using earth to hold it in place.

Salpiglossis

A very showy bedding or border plant, flowering from July to early autumn. The exquisite beauty of the flowers with their rare combination of color is a revelation. Transplant to a foot apart. Half hardy annual. $1\frac{1}{2}$ to 2 feet high.

Culture.—Sow seed in shallow boxes of light soil in a temperature of from 60 to 70 degrees in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure is best.

Salvia

One of the handsomest flowering plants we have for garden decoration blooming in spikes from mid-summer until killed by frosts. Their compact bushes literally ablaze with brilliant flowers really have no rivals. About 3 feet high. Half-hardy perennial.

Culture.—Seeds may be sown very early in spring so plants will blossom in fall or started in late summer so that good healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Saponaria

Multiflora Calibrica

Mixed Colors

Height Six Inches

An admirable dwarf bedding plant, with neat foliage, and small, cross-shaped blossoms, of delicate tints of rose and pink. Adapted for vases and hanging baskets; make a fine display grown in a circular bed; quite hardy, blooming till after severe frosts.

How Grow One Hundred Varieties of Favorite Flowers

Culture.—Sow in-doors, early, or later in open ground; transplant to about one foot apart, they will spread and cover the ground as with a mat, compact and densely dotted with the small flowers.

Scarlet Runner

Will grow to the height of 12 or 15 feet and produce a profusion of scarlet flowers. Needs strings or some support to climb on. Sow in spring when ground is warm where they are to remain. Plant about three inches deep.

Schizanthus

Butterfly Flower

A beautiful species of plants for out of door decoration. Easily cultivated, of bright colors and splendid for bouquets; do well in any garden and may be removed to the house in autumn. Give plenty of room. Half-hardy annual, 2 feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. The soil should be well pulverized and enriched with fertilizer.

Sensitive Plant

Mimosa Pudica

An interesting and curious plant with globular heads of pink flowers; well known for the extreme irritability of its leaves, which if touched drop, touching the lower ones and the whole plant will appear as if wilted and dying. Keep six inches apart. Half hardy annual. 1 to 2 feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure is best.

Stock

The stock is one of the most popular garden flowers either for bedding or pot culture. For brilliancy of color, fragrance, profusion and duration of bloom it is unsurpassed. Hardy annual one foot high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure is best.

Sunflower

Helianthus

Double

An exceedingly double variety of this well-known plant adapted by its stately growth for a background

to the lawn appearing to advantage in masses. Thin to 4 feet apart. Hardy annual, 5 feet high.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure is best.

Sweet Peas

Lathyrus Odoratus

For its beauty and fragrance the sweet pea is the queen. Within recent years it has been brought to a high degree of development and is now one of the most popular garden favorites. Their chief use is for cut flowers, although their value in the garden is not to be ignored. Sow early. About 4 feet high. Hardy annual.

Culture.—Sow in the spring in the open ground where they are to grow, the sooner the seeds can be got in the better. They delight in a moist, loamy soil, should be sown two inches deep. If not allowed to go to seed they will flower much longer.

Sweet Rocket

Hesperis Matronalis

One of the old fashioned garden plants, also known as Dames Rocket and Dames Violet. A most desirable hardy flower, bearing spikes of brilliant, fragrant blossoms. Very excellent among shrubbery or in borders. Grows 2 to 3 feet high. Perennial.

Culture.—Seeds may be sown very early in spring so plants will blossom in fall or started in later summer so that good healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Sweet William

Dianthus Barbatius

A well known, attractive, free flowering plant producing a splendid effect in bed and borders with rich attractive flowers borne in heads or clusters, about 18 inches high. Hardy perennial.

Culture.—Seeds may be sown very early in spring so plants will blossom in fall or started in later summer so that good healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Thunbergia Alata

Black Eyed Susan

Beautiful, rapid-growing climber, preferring a warm sunny situation, very fine for hanging baskets, vases, low fences, etc. Height 4 feet. Annual.

Culture.—Sow out of doors when danger from frost is over, cover-

ing the seed to a depth of about four times its size, when planted in-doors, young plants can be transplanted to the open as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure is best.

Verbena

Hybrida

Verbenas are becoming more popular every year, and scarcely need a description. For garden beds or effective massing the Verbena is unequalled. Height 1 to 1½ feet. Annual. Keep 12 or 18 inches apart.

Culture.—Seed should be sown four months before the plants are wanted. It is often slow in germinating. Seedling plants are much vigor-ous than those from cuttings, but if a special color is wanted seedlings are not to be depended upon.

Violets

Viola Odorata

The violet should be in every garden on account of its fragrance and early appearance. They are well adapted for border or rock work and commence putting forth their flowers all through spring. Hardy perennial. 4 inches high.

Culture.—Seeds may be sown very early in spring so plants will blossom in fall or started in late summer so that good healthy plants and a profusion of flowers will be had the following year. A light mulch of manure is desirable for winter protection.

Wall Flower

Cheiranthus Cheiri

An old garden favorite, well known, deliciously fragrant, blooming early in spring with spikes of beautiful flowers, and dark green foliage. 1 to 3 feet. Biennial.

Culture.—The seed should be planted early in spring in open ground, and will blossom before fall. The plants will bloom again the following year but the young plants bloom best and seed should be sown every spring.

Zinnia

Elegans

Youth and Old Age

This plant is one of the most brilliant and showy of annuals. It bears large double flowers from early summer till frost with very little attention. Provide plenty of room; at least 18 inches. Height 2 feet. Annual.

Culture.—Seeds should be planted in the open ground after all danger of frost is over, or if started in-doors, young plants can be set out in the garden beds as soon as warm weather appears. A rich garden soil, deeply dug and liberally enriched with manure is best.

BEAUTIFUL HOMES

How to Give Added Charm by the Use of Trees, Shrubs and Flowers.

The happier the home, the greater is the desire of the family, as a rule, to embellish it by all the means within the reach of the family purse. And there is no embellishment more gratifying to the eye and none that pays better in the long run, than the improvement of the lot or the surrounding grounds by an artistic arrangement of ornamental trees, shrubs and flowering plants.

To have a beautiful home, to sit down under the vine that clings upon its walls, to rest in the shadow of the tree that grows beside it, to eat of the fruits that ripen on its soil—this is the realization of many a pleasant dream, the result of many a worthy ambition. To fail to possess a home in which one can take both comfort and pride is to largely miss life's purpose.

Consider the joy and the privilege of bestowing on childhood the pleasure and the blessing of a charming home!

No attraction can be devised that should more surely hold the child to the fireside than attractive home surroundings. It is one of the greatest joys of youth to welcome the visitor to an attractive city residence. The admiration and praise bestowed upon the home are a constant source of pride and delight to the children of such a household.

Thousands of people in the cities can bear testimony to the fact that they left

their country homes because of shabby surroundings which, as they grew up, gradually became to them a constant source of annoyance and shame.

On their visits to the city they had seen delightful parks and the beautiful grounds of city residences; and then to come back to an old, unpainted, dilapidated house, with a shambling barn and a few ragging swine and fowls, amid weeds growing where there might have been beautiful lawns, ornamental trees, and flowers, caused a feeling of depression that made them resolve to quit the wretched old premises as soon as they possibly could.

It is not only the city or the suburban home that can be made a thing of beauty and a joy forever by landscape gardening. Every farmhouse, every country school-house, every building in fact that stands in its own grounds, can be immensely improved in appearance by the aid of trees, shrubbery and plants. In the pages immediately following a number of examples are shown, and there is also a list of ornamental trees adapted to various regions, with cultural directions and suggestions of value to the home builder. An outline map of the United States divided into districts, each plainly numbered, will facilitate the choice of trees suited for planting in each district.

Beautiful Homes—Continued

There is no easier way to enhance the value of detached residence property than to give it an ornamental setting of lawns, trees and shrubbery, with flower-beds blooming in season. A home so embellished is like a gem in a fine setting. The gem itself, like the home, is the principal thing, but an appropriate setting enhances its beauty, and in the case of the home an attractive setting enhances its value as real estate.

In every neighborhood one sees residences that stand out prominently among their neighbors by reason of their beautiful and well-kept surroundings. The owner of such a place gives tangible evidence of good citizenship. While his home delights the eye, benefits and gives a tone to the whole neighborhood, he has his reward in the gratification of the artistic sense—the sense of the beautiful, in the greater pleasure and satisfaction of his family, and in a material addition to the value of the property, which he promptly discovers should he desire to sell.

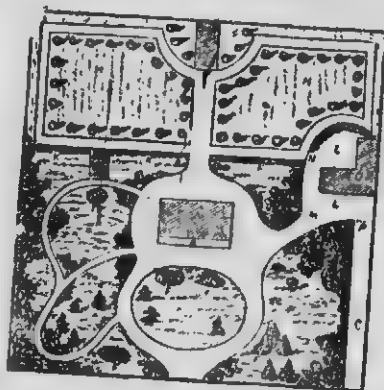
It can be safely said therefore, as the result of experience in every section of the country, that it is not only desirable to embellish home surroundings from the standpoint of family comfort and personal pleasure, but also from the financial standpoint as well. Small expenditures for landscape gardening, ornamental trees and shrubbery, flowering plants and other outdoor ornamentation

of the home, will usually pay the owner in increased market value of the property.

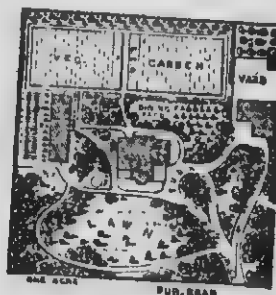
In another direction, too, the improvement of residence property by the cultivation of lawns and gardens is of advantage to the owner, if resident on the place, or to the tenant if the property be leased. The care and up-keep of a garden of any size will afford both recreation and exercise, with great benefit to the health of those who otherwise lead a sedentary or indoor life. And if the garden does nothing else but develop a desire for life in the open air, it is well worth while, for that desire is a natural one, prompted by healthy instincts. To the women of a household gardening is usually a great delight, while educators are all agreed that it is most desirable to give growing children individual pieces of ground to cultivate. Therefore, there are many good and sufficient reasons why the surroundings of the home should be embellished by cultivation, by the planting of trees and shrubs, and by the encouragement of the gardening instinct which the great majority of men, women and children possess in a marked degree.

In planning the improvement of the home lot or grounds the information contained in the preceding pages, regarding the cultivation of many varieties of favorite flowers, will be found extremely useful, as well as the pages that follow, on the use of ornamental trees.

Two Plans, each for Laying Out One Acre.—From "Woodward's Country Homes."



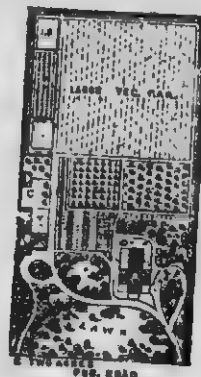
Locations
 A. Dwelling. B. Piazza. C. Passage.
 D. Greenhouse. E. Grapery (house).
 F. Flower Beds. H. Kitchen Garden.
 K. Trellis of Grapevines. L. Yard.
 M. Gate. N. Gate. O. Stable, Barn.



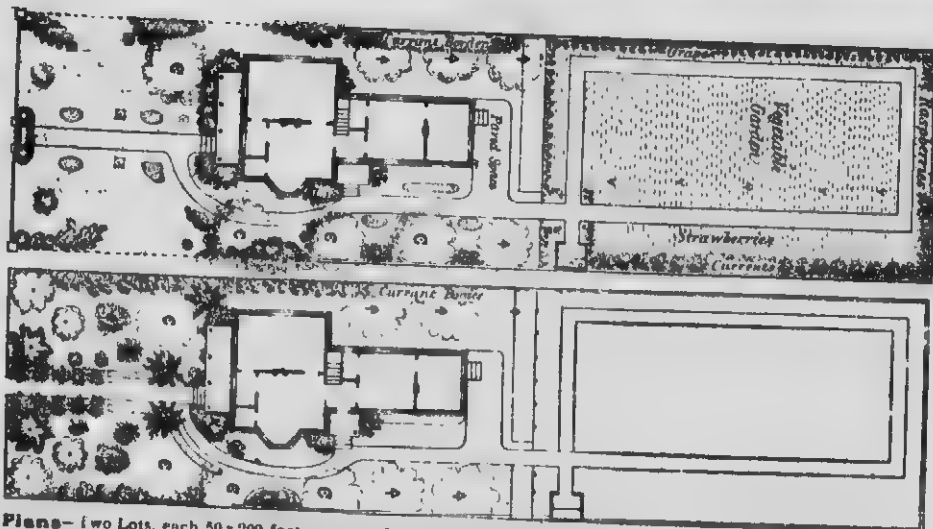
Explanation.

S. Stable and Barn
 A. Greenhouse and Grapery
 O. Double Hennerly
 H. Hen Yard, set with fruit trees.
 D. Grape Arbor, fruit trees.
 I. Dwarf and Standard fruit trees.
 F. Fountain
 J. Flowers
 O. Lavatory and Garden Tool-house in rear.
 M. Dwarf fruit trees.

Plan for Two Acres.



Locations.
 A. House. E. Entrance
 B. Stables and Carriage House.
 D. Greenhouse and Grapery
 I. Hennerly, with double yard



Plans— Two Lots, each 50x200 feet in size. Dotted line shows open views across the lawn. Lower lot shows too many trees. In a short time the view of roadway in front will be completely cut off.



One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



ABRONIA



ACROCLINIUM



ADONIS



AGERATUM

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



ALYSSUM



AMARANTHUS



AMPELOPSIS



ANTIRRHINUM

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



BARTONIA



BEGONIA



BROWALLIA



CACALIA

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



CALENDULA



CALLIOPSIS



CANARY VINE



CANNA

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



CANDY TUFT



CANTERBURY BELL



CARNATION



CATCHFLY

One Hundred Varieties of Favorite Flowers

Directions

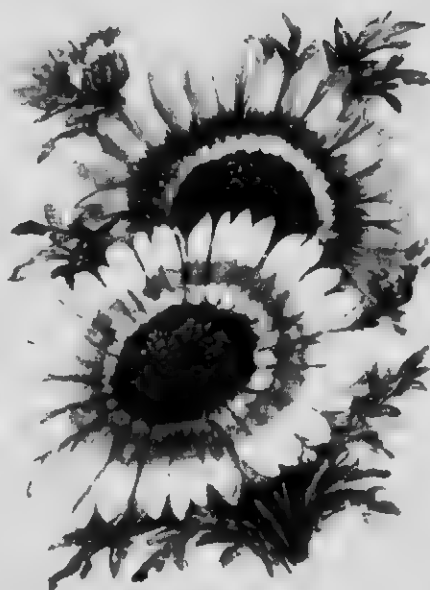
HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



CELOSIA



CENTRANTHUS



CHRYSANTHEMUM

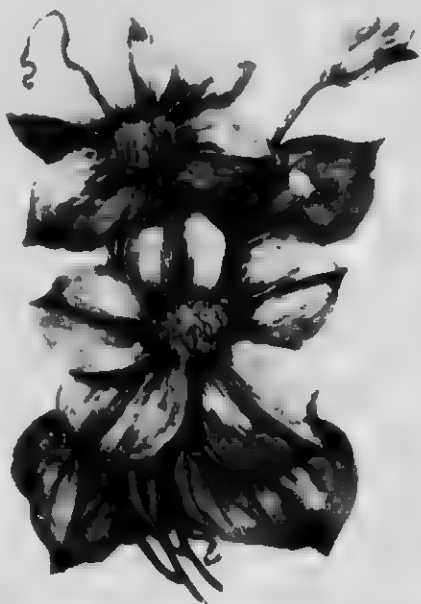


CLARKIA

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



CLEMATIS



CLIMBERS



CLINTONIA



COBOEA

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



COCKSCOMB



COLEUS



COLUMBINE



GOMPHRENA

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



CONVOLVULUS MINOR



COSMOS



DAHLIA



DATURA

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



DIANTHUS



DOUBLE DAISY



ESCHSCHOLTZIA



FORGET-ME-NOT

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



FOUR O'CLOCK

FOX GLOVE

FUCHSIAS

GAILLARDIA

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



GERANIUM



GLADIOLUS



GODETIA



GYPSOPHILA

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



HELICHRYSUM



HELIOTROPE



HIBISCUS



HOLLYHOCK

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



HONEYSUCKLE



HYACINTH BEAN



ICE PLANT



IVY

rs
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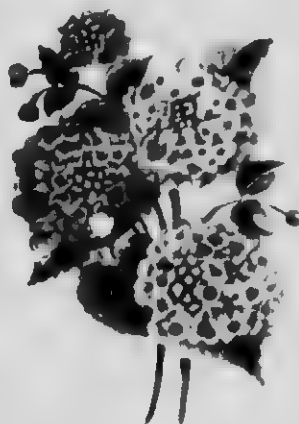
One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



JAPANESE HOP



LANTANA



LARKSPUR



LILIES

One Hundred Varieties of Favorite Flowers

Directions

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LILY OF THE VALLEY



LINUM



LOBELIA



LUPIN

One Hundred Varieties of Favorite Flowers

Direction.

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



LYCHNIS



MARIGOLD



MAURANDIA



MESNONETTE

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



MOURNING BRIDE



MORNING GLORY



MOURNING BRIDE



One Hundred Varieties of Favorite Flowers

Directions

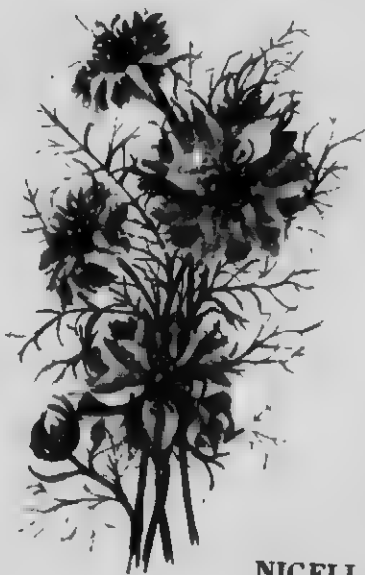
HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



NASTURTIIUM



NICOTIANA



NIGELLA



N

PANSY

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



PASSION FLOWER



PEONY



PETUNIA



PHLOX

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



PINKS



PRIMULA



POPPY



PORTULACA

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



PRIMROSE



PYRETHRUM



RICINUS



ROSE

ers
E

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



SALPIGLOSSIS



SALVIA



SAPONARIA



SCARLET RUNNER

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



SENSITIVE PLANT



SCHIZANTHUS



STOCK



SUNFLOWER

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



SWEET PEAS



SWEET ROCKET



SWEET WILLIAM



THUNBERGIA

One Hundred Varieties of Favorite Flowers

Directions

HOW TO PLANT AND CULTIVATE GIVEN ELSEWHERE IN THIS VOLUME



VERBENA



VIOLETS



WALL FLOWER



ZINNIA



Home in Quiet Repose.

View No. 1 shows plain house and rockery. No. 2, ornamented with vines. No. 3, house in distance and beautiful lawn in front.

No. 3 view taken from "Dallmeator," New York.



Landscape Views.

View 1. Shows possibilities on one acre. 2. Opportunity on five acres. 3. How a little stream may be made a feature of beauty. 4. How a neighborhood may have a park; neighbors each contributing conjointly to keep it up. 5, 6. Designs for rustic bridges.

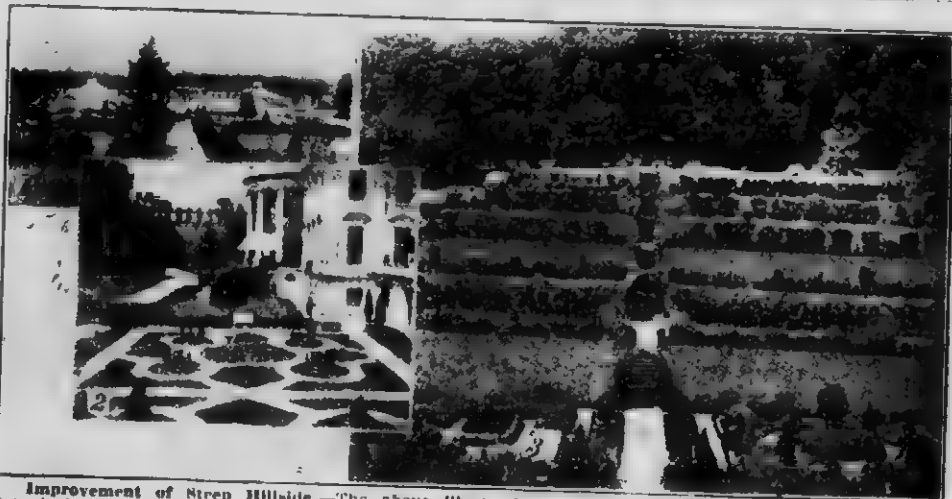
Views Taken from Henderson's Picturesque Gardens



FRENCH CANNAS FOR LAWN BEDDING

The illustration to the right gives a good idea of the value and beauty of the dwarf large-flowering French Cannas as lawn bedders. These Cannas are perfectly at home in the American climate, and when grown in rich deep soil and not allowed to suffer for lack of moisture, they are gorgeously effective, particularly so when massed one sort only in one bed. Their luxuriant dwarf growth, immense Gladiolus-like flowers of most brilliant colors, and their profusion and continuity of bloom until frost render them easily the most satisfactory and popular bedding and garden plants grown.





Improvement of Steep Hillside.—The above illustrations represent as follows: No. 1. Plant House, Botanical Gardens, St. Louis. No. 2. Flora Culture, White House Grounds in Washington, D. C. No. 3. Possibilities of terracing and ornamenting a hillside. No. 3. View taken from "Country Life in America."





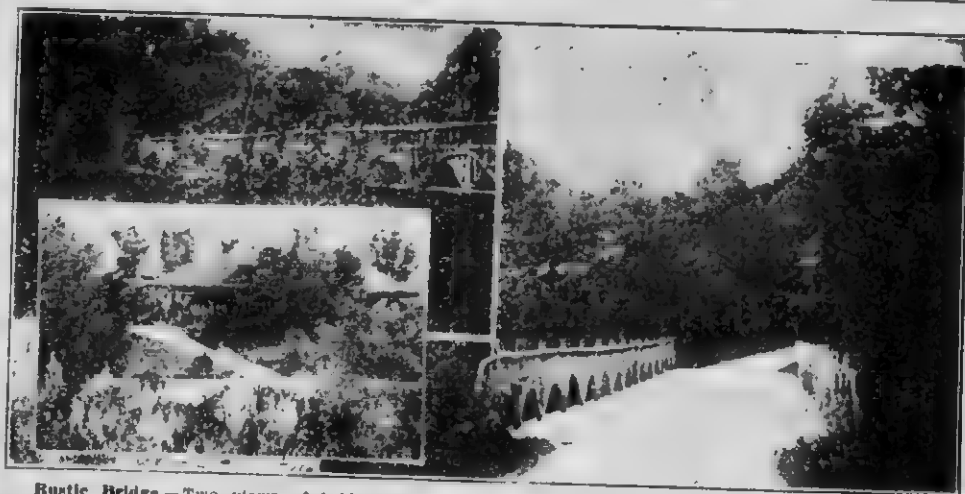
A Rockery.

The left side picture gives a park scene containing a winding path bordering a lake. The right side view shows a pile of rocks intermixed with rich earth, from which come vines, shrubs, ferns and flowers, the whole illustrating possibilities with a collection of stone.



Improvement of a Rear Yard.

The above view, developed through the efforts and taste of the National Cash Register Company, at Dayton, O., shows one of the many beautiful rear yards in that enterprising city.



Rustic Bridge.—Two views of bridge, and one showing scene in rear of a railroad depot, roof so extended as to permit passage of carriages underneath, protecting people from down-pour of rain, when alighting from and entering carriages. Suitable arrangement also for park pavilion.



CYCLAMEN



STROPHYLLUM



MAMMOTH BROWALLIA



BLUE

ORANGE





Thomas Circle, Washington, D. C.
Shows how a public square in the center of a city may be improved.



FANCY LEAVED CALADIUMS



CROWN OF THORNS.



CALADIUM BICOLOR.

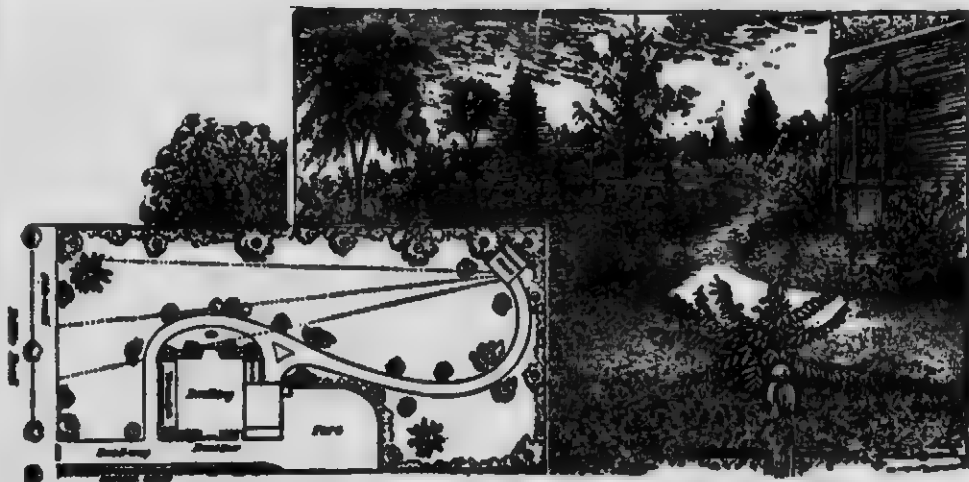


Lawns Kept in Order by Neighbors Conjointly.

Fences Removed.

A fence is a disfigurement to any property. It shuts off view, makes the house seem lower and narrows the appearance of the lot. This illustration, taken from "Hill's Manual," represents all division enclosures and front fences removed. This gives every resident of the neighborhood the advantage of living in a beautiful park.

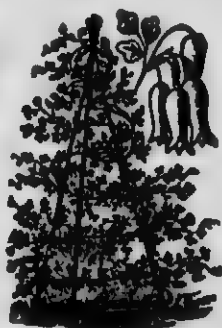
A serious hindrance to improvement is that individual who will persist in keeping up a front fence.



View of Residence and Summer House.—This illustration from "Parson's Landscape Gardening," presents good arrangement for ornamenting the front of small home grounds. The view from the bay window is not obscured, while the dotted lines, in the diagram, show open vistas over all the lawn. The curving pathway adds to the apparent size of grounds.



BRYANONIA



ADLUMIA



GOURDS



JOHNSON'S AMANTILLAS

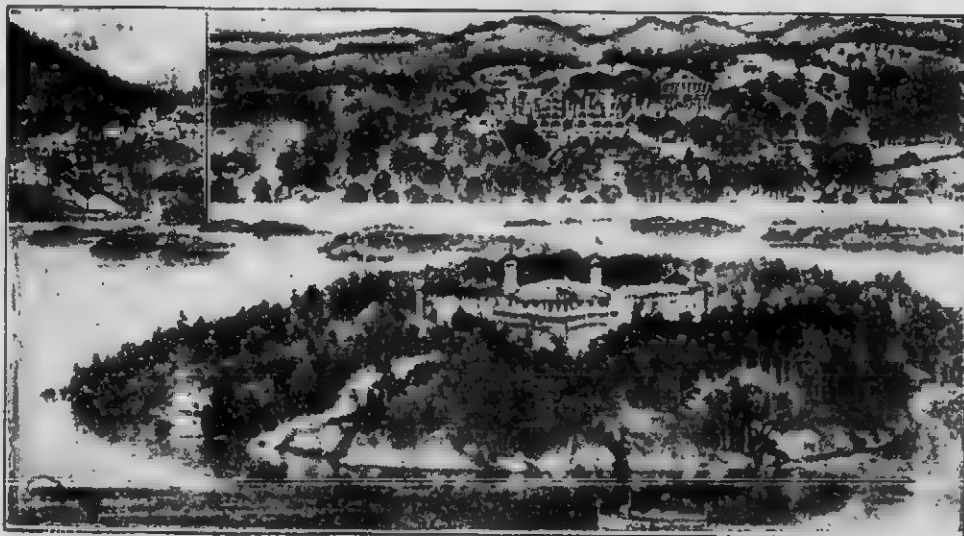
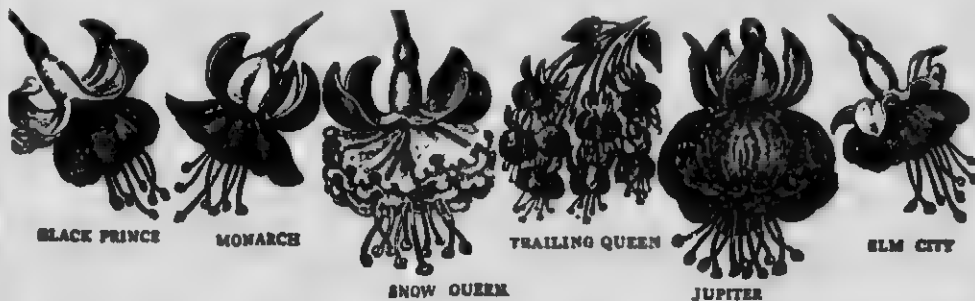


Show Grounds, Botanical Gardens, St. Louis.

To enable visitors to see different plants grown here, a display is made, as shown above.



Park View in Washington, D. C.—Among the many beautiful park scenes in Washington is the Mall, shown above in the neighborhood of the Agricultural building.



Wilderness Reclaimed.—Pictures show how rough, wild forest may be made pleasure resort.

DOMESTIC ANIMALS

Breeding and Care of Horses, Cattle, Sheep, Swine, Etc.

The dependence of man upon the lower animals, for service and support, is realized upon the farm as nowhere else. Horses, cattle, sheep and swine are all found on the well-stocked farms, each playing an important part in the general scheme of agriculture and contributing in no small degree to the welfare and success of the farmer.

In the following sections each kind of livestock raised or used upon the farm is taken up and the reader is informed as to the different breeds, methods of breeding, care and uses of the various animals. Thus, the different breeds of horses are described and illustrated and directions are given how to breed, train, feed and produce the best. On the largest farms gas tractors and motor vehicles of various kinds have partially superseded the horse for some purposes, but the noble quadruped is still the farmer's best friend in the great majority of

instances.

The section devoted to the important subject of cattle-raising describes the different breeds of cattle raised in North America, as well as the European breeds that are freely imported for the improvement of American herds. The characteristics of each of these breeds and the points in which they excel are all clearly shown, as well as the best methods of feeding and care.

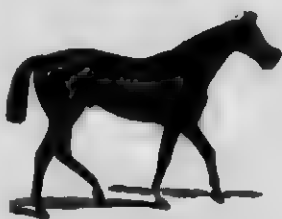
Sheep are used in many parts of the country to aid in clearing land for culti-

vation, after the timber is cut off, while sheep-raising for the wool and for food is an important industry, occupying many thousands of acres in the western states. The methods of breeding and management of sheep, with illustrations and descriptions of the various breeds and much miscellaneous information regarding them, will be found in the following pages.

Hogs are so useful and profitable an adjunct of the farm or market garden that few tillers of the soil fail to establish a hog pen or hog pasture. The information given in the section on swine includes a full description of the breeds that can be most profitably raised, as well as how to raise them.

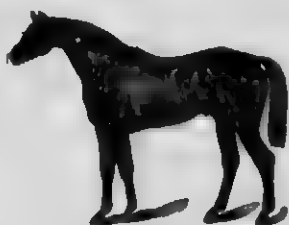
Considerable space is devoted to the raising of poultry because of the general public interest in the subject. As a business it is one of the most generally profitable in the United States and in the aggregate it is one of the most important. It requires but little capital and little land to start in this business, but the novice should equip himself in advance with the practical information to be found in the pages that follow, which deal with the raising of chickens, ducks, geese, turkeys and squabs. There is also plenty of good advice for those who contemplate going back to the land with the idea of making a livelihood and winning independence with the willing assistance of the American hen.

HORSES; DIFFERENT BREEDS IN THE UNITED STATES:



American Running-Horse.

The American Running Horse, a fine descendant of the English Thoroughbred, dates back nearly 200 years.



English Thoroughbred.

The English Thoroughbred is undoubtedly of Arabian origin, but has been improved by crossing with other breeds.



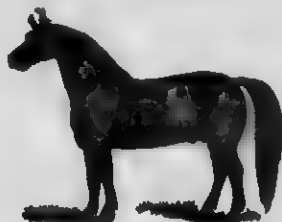
Mule.

The Mule is a hybrid offspring of the ass and horse, and combines good traits of both.



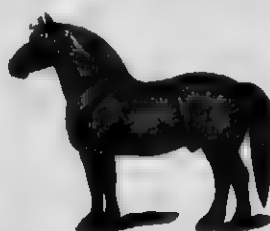
Ass.

The Ass comes from the East and dates back to a very early period in the world's history.



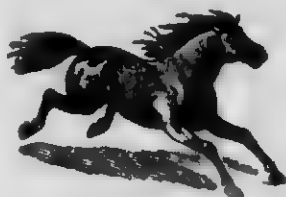
Cleveland Bay Horse.

The Cleveland Bay is a mixture of English draft horse and varied stocks imported from Europe.



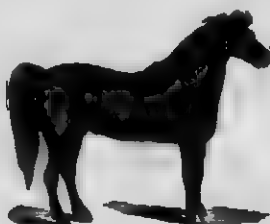
Percheron Horse.

The Percheron, a valuable draft horse, originated in La Perche, a former section of France, near Normandy.



Mustang Pony.

The Mustang is a native of the Southwestern Wilds of North America.



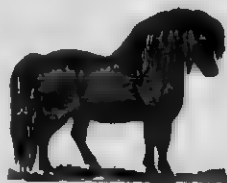
Morgan Horse.

The Morgan, it is claimed, comes from a horse formerly owned by Justin Morgan, of Randolph, Vt.



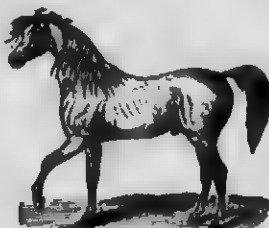
Hambletonian Horse.

The Hambletonian, originated in Orange Co., N.Y. Stallion, owned by Mr. Eysdyk, lived 27 years; had 1,324 colts.



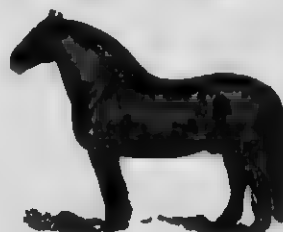
Shetland Pony.

The Shetland grows in a wild state on the Shetland Islands, where it is caught and exported.



Arabian Horse.

The Arabian is known to have existed before the Christian era. Origin uncertain. Some claim Egypt, others



Clydesdale Horse.

The Clydesdale, celebrated as a draft horse, originated in the valley of the River Clyde, Scotland.

DIFFERENT BREEDS

HORSES

DESCRIPTION OF VARIOUS KINDS

How to Breed, Train, Feed and Produce the Best

The nativity of the horse has been ascribed to Central Africa, whence he was introduced into Egypt and thence through Persia into Greece, Western Europe and to Great Britain.

Origin of the Mustang

In 1533 a few horses were imported into South America and from these have come the immense herds that have spread over the southern part of our continent.

Thence they came north, passed the isthmus of Panama into Mexico and scattered northward into California and along the Pacific Coast, their scanty food and wild life resulting in a distinct breed known as Mustangs, weighing from 450 to 500 pounds. They reach maturity at the age of three years and are quite extensively used in Mexico and Texas.

The American Running Horse

The American Running Horse is a descendant from the English thoroughbred. The existence of this species of turf heroes dates back over 200 years, and when crossed with any other good breed improves it for speed and road service.

The Mule

The mule is the hybrid offspring of the ass and horse and combines many of the better traits of both. The union of the male ass and the mare produces the most serviceable and valuable mule which often is superior in intelligence to both of his progenitors. His weight is about 1,000 pounds; his height, 15 hands; his constitution, hardy in the extreme; his disposition, docile; his head is large, as are his ears. His coarse hair is mostly dark. His average value is from \$15 to \$250.

The Ass

The Ass dates back to a very early period in the world's history, and is among the first of the domestic animals mentioned in the Scriptures.

In the East, where he originated, he is used under the saddle or for carrying burdens. His average weight is from 500 to 600 pounds.

With a large and clumsy head, he combines enormous ears, small eyes, a long back, short legs, hard, serviceable hoofs, and coarse hair.

The "burro," common in Texas, Central America, and at pleasure resorts for children's use, is a smaller animal of the same species, with similar characteristics and usefulness.

The Cleveland Bay Horse

The Cleveland Bay, lighter in weight than the heavy draft horse, has plenty of carriage and action for the road, making a fine, stylish carriage horse. The Cleveland Bay is a mixture of English draft horse and various breeds imported from Europe.

The Percheron Horse

The Percheron is one of the most useful animals for heavy hauling and general work.

The Percheron-Norman has an average weight of about 1,650 pounds, is 16½ hands high, has a hardy constitution, small head and ears, heavy quarters, large bones, medium neck and shoulders, wide chest, a short back, medium legs, fine hair, broad hoofs, grayish color, fine action, and a kind disposition.

The Morgan Horse

The celebrated "Morgan Horse," foaled in 1793, was probably a grandson of imported Wildair, out of a Canadian mare. His progeny are stout and enduring, with good action, great hardness of constitution and some of them distinguished as fast trotters, "Columbus," "Grand Bashaw," "Andrew Jackson" and the Morse horses have all founded families of trotters.

Hambletonian Horse

The Hambletonian is the name of a breed of horses originating in Orange county, New York, in 1849. From the Hambletonian stallion came several distinguished horses. Among them were Dexter, Bruno, Goldsmith Maid, Belmont and others widely known at that time as standing high in the first rank of fast trotters.

The average Hambletonian weighs about 1,100 pounds, stands 15½ hands high; matures at 5 years; has a hardy constitution; has fine hair of a bay color, and is one of the highest-priced horses in the market.

The Shetland Pony

Shetland Ponies are bred, captured wild and exported from a region covering 450 square miles, comprising about 100 islands lying north of Scotland, known as the Shetland Islands. All horses there are diminutive in size; even people are small in stature, active and hardy.

The Arabian Horse

The Arabian is known to have existed sometime before the Christian era. His origin is uncertain, some attributing it to Egypt, others to Arabia.

His form is compact and muscular, with graceful outlines. His coat is smooth, his size is medium, his height averaging about 14½ hands, his motions are agile, his speed, per mile, ranging from three to four minutes. He is considered better for riding or driving than for heavy work. In India his value formerly ranged from \$750 to \$1,000.

The Clydesdale Horse

The Clydesdale, or Scotch, is a larger and showier horse than the heavy French breeds; have strong constitution, are docile, easily kept, and liable to take on fat. All colors, generally have white feet.

HOW GET THE BEST HORSES

HOW BREED AND TRAIN THEM

THE FUTURE OF THE HORSE

It is difficult to determine what the future of the horse is to be. Contrary to expectations, the price of horses has continued to advance, notwithstanding the automobile has come in great numbers. Today horses command higher prices than for twenty years. The principal effect of the auto, thus far, on the horse, has been to relieve the animal of long and heavy traffic.

In the meantime, the horse is here to be taken care of and utilized for his commercial value.

How Get the Best Horses

If the horse is to be kept as a matter of profit it should be developed physically and intellectually as much as possible. This includes breeding, feeding, and training of the animal.

How to Breed

Like begats like in breeding horses. The stallion kept for service should possess the qualities which it is desired should be transmitted to his progeny. Both dam and sire should have all the good qualities desired in the colt.

Particularly should it be understood that the colt will inherit the breed and no stallion should be kept for breeding purposes unless he can show a long line of desirable ancestry. The accidentally superior mongrels do not reproduce their superior qualities, but transmit back to an inferior ancestry.

But aside from pedigree, various conditions may affect disposition, health, endurance, style, and ambition of the immediate parents.

The stallion should not have his temper spoiled by dark stable loneliness, from being shut in a close box stall away from sight of other horses. He should not be exhausted by overwork, nor be subjected to annoyance whereby he cultivates ill temper. On the contrary, he should have some regular exercise in riding or double harness driving and should be so situated that he can see and have the company of other horses.

Particular attention should be kindly given to the mare as she nears foaling time. She should not have to endure overwork at that period nor should she hear any harsh words, and her large, roomy box-stall should be thickly laid with soft straw.

Weaning and Training

At the age of four or five months the colt should be gently handled. At the age of five or seven months, having been petted, caressed, and taught to eat and drink; it has also been taught to be led by the halter or foretop.

At this period the colt may be weaned and educated to the having of its feet handled; may learn to be harnessed; may be hitched to some light vehicle and taught to draw light loads.

Importance of Being Gentle

In all the treatment of breaking and training the colt no loud or harsh words should be used. Only gentle voice and patience are necessary.

If the colt shies at anything, allow him to come to it, smell and examine it until satisfied that it will do him no harm; thus, in a short time, the colt may be broken to driving and trained to the saddle.

To Break the Wild Horse

To bring a wild or vicious horse that has never had any training under subjection, it is only necessary to use a straight bit, two leg-ropes, and a surcingle. The left leg is buckled up with strap No. 1 and the nose of No. 2 slipped around the off fetlock and the other end passed through the surcingle under the belly.

The horse, indignant at being so hampered, hops for a time on three legs around his stall, which

should be thickly laid with tanbark or straw. When he finally stops and draw on strap No. 2 brings him down upon his knees. Nothing else is attempted until the horse has completely exhausted his energies. When a proper amount of work has been done over the animal, he is put on his side and after some minutes of rest, the operator strikes the tired animal with the handle of a broom, which are relaxed, and the horse is then led to the manger and the operator

Training, Feeding and Care

When the horse is brought back to the stall, he should be given a quart of corn. The

at a colt should be fed so much as to cause him to be hungry. A better feed lightly and a little more than a full stomach from bad food or

good food. The horse should be fed with regularity. The feeding and watering is very essential. A horse should be fed with corn, oats,

and hay may be fed. Never feed raw hay, corn, or oats where old can be obtained. All hay should be cut and it is best to mix with ground corn and oats and moisten with hot water. The moisture prevents the dust from entering the lungs. A horse heavily worked when stuffed full of loose, dry hay is liable to have the heaves. When hard at work increase the ground grain feed but not the hay.

A Good Feed

An excellent feed is made by mixing coarse meal, ground and bruised oats, and bran in the proportion of one-half bushel of the latter to a bushel each of the meal and oats, adding a handful of salt and mixing with water—hot is best—when fed.

A warm mash is a great invigorator to a horse tired out with a long, hard day's work. A handful of salt and clean wood ashes mixed makes a good appetizer and preventative of disease. Carrots, turnips, or mangelwurzel beets, cooked or chopped fine, make a good, occasional addition to the diet and tend to correct constiveness.

Temperate Use of Water

Water moderately three times a day. In hot weather, oftener, using a clean pail, as horses often are very particular about the apparent cleanliness of an article they drink from.

Importance of Stable Cleanliness

Next to proper feeding in the barn is cleanliness. The horse should be removed from his stall on the arrival of the groom in the morning, taken into the open, fresh air, and there have his skin thoroughly scratched with a curry comb. Following next in order, a small brush broom should sweep out the dust loosened by the comb. This will be succeeded by a curd with wire teeth or comb with wooden teeth, which will comb and carefully separate all hairs in mane and tail. The finishing touch will now be put on by a large, woolen cloth, which rubbed all over the animal will make hair shine and give it a varnished appearance.

Cleanliness in the Stable

Before returning the horse to the stable its stall should be thoroughly cleaned, made dry and no odor left.

To compel a horse to stand in a stable in a bed of manure, breathing the pungent odor, is a cruelty which will result in injury to the animal.

The General Care and Cost of Keeping Horses

A Space for Rolling

A large, roomy space, with sanded dirt floor, should be assigned to the horse in which to roll. This may be in the barn or in a nearby yard outside. Improvement in health results from the horse rolling. Examine the horse's feet to see that no mud or gravel is allowed to accumulate there. Wash feet and legs occasionally and wipe dry. The horse should never be compelled to stand in a wet stall or in a mud-puddle by the roadside.

Do Not Blanket in Stable

Except in exceedingly cold weather, in which there is a good deal of wind in the stable, the horse should not be blanketed in the barn, but care should be used in protecting the animal from severe wind or storms on the outside of the stable.

It is particularly bad to drive the horse into a perspiration, then hitch and leave the animal to endure a cold wind without thick blanket protection at such time.

It is well to be provided with waterproof covering in case of storms. Blankets should be well supplied with buckles and straps to shut out wind, wet and snow.

The Stable Floor

The stable floor, preferably made of plank, should be well covered with tanbark, sawdust, shavings, or fine straw. Colts should have abundance of straw to lie on, should be also curried and cleaned, becoming thus accustomed to being handled.

Cost of Keeping Horses and Automobiles

As horses are yet before us to be fed and cared for, and as the mechanical horse is crowding into the barn and onto the premises, it is a live question as to the expense of maintaining the horse in comparison with the automobile.

Cost of Keeping the Horse

The average active period of horse usefulness is from five up to twenty years, depending upon the care which is given to the animal. Much can be said about the horse which needs to be said to those who are going into the business of rearing horses.

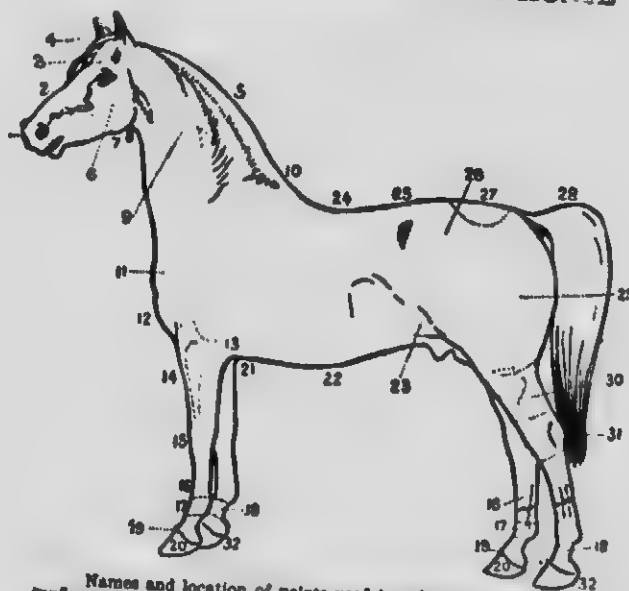
Information at the Livery Stable

For facts concerning the expense of keeping the horse, the reader will go to the livery stable, where they know the exact ration which the horse should be fed. There, also, will be learned about age, employment, and weight of the animal, the amount and kind of food required, how often administered, cost of shoeing, medical attendance, earning capacity, etc.

Necessary Veterinary Knowledge

Investigation concerning keeping the horse will lead to the conclusion that the horseman should obtain a complete volume on veterinary management to do justice to the subject of caring for domestic animals. We close this chapter on the horse with brief attention to cruelties liable to be practiced on the horse.

THE VARIOUS POINTS OF THE HORSE



Names and location of points used in referring to the external conformation of the horse. 1, muzzle; 2, face; 3, forehead; 4, poll; 5, crest; 6, cheek; 7, lower jaw; 8, throat; 9, neck; 10, withers; 11, point of shoulder; 12, b; 13, elbow; 14, forearm; 15, knee; 16, cannon or shank; 17, fetlock; 18, pastern; 19, coronet; 20, foot; 21, girth; 22, belly; 23, flank; 24, back; 25, loin; 26, haunch or hip; 27, croup; 28, dock; 29, thigh or quarter; 30, lower thigh or gaskin; 31, hock; 32, heel. (Mumford.)

CRUEL TREATMENT OF HORSES

Kindness Pays a Dividend in Increased Service and Value.

It is a strange fact that many people think that the ownership of a horse or cow or other animal carries with it the right to abuse one's property. Only a few years ago a man felt he had the right to beat his horse—to death if he wished—with the same liberty as he mowed or left uncut his own weeds. But the spirit of co-operation has prompted farmers to demand laws compelling everyone to keep down noxious weeds; it is realized that this is not a matter for private preference or personal convenience, but a question of general welfare. But since one farmer does not suffer when another overworks his own horse or starves it or clubs it, and one liveryman does not lose when his rival allows patrons to abuse his teams, so for a long time the public interest in the welfare of private livestock was not considered.

Then came the S. P. C. A., the *Society for the Prevention of Cruelty to Animals*, and it was not long before laws and ordinances were drafted to prevent mistreatment. As a result, we see little of the beating and starving of defenseless horses that was common even fifteen or twenty years ago. But the change has not been entirely due to the activities of the Society. Horses are daily increasing in value, and the owners of livestock realize that it does not pay to take any chance of injuring valuable property. A man doesn't take a sledge hammer to a twenty-one jewel, solid gold watch just because it won't run. People have been learning how to take care of animals. Aside from the fact that they often make the best of friends, they represent the investment of so much capital, an investment which ought to pay as large a dividend as possible. Ill treatment reduces the dividend. The most practical kind of experience tells that kindness will get more work from a horse than will the use of the whip. And any child knows that a horse gets his strength from the food he eats, and a starved horse cannot give effective service any more than can a stove without fuel. It's like trying to run a gasoline engine on water—it can't be done.

When a man underfeeds his stock we call him selfish, stingy. He isn't. He's merely showing poor business judgment and is cheating himself. The horse shows a profit on the food he eats. The less food he gets, the less work he is able to do, and the less profit he pays.

Farmers are being educated every day in the business of agriculture, and they are learning to take care of their stock; so there is much

Cruel Treatment of Horses—Continued

less abuse of dumb animals. Bad temper rather than bad judgment is coming to be the only cause of cruelty.

The owner of a horse realizes that the animal repays in increased value and increased work all the time and care and money that is invested in him. In the summer he must be protected from flies, from overwork or over-driving in the extreme heat; in the winter he must be blanketed against inclement weather, not for any sentimental reason, but because a horse is "animated money."

The only abuses practiced to-day by intelligent owners are inspired by "style." Over-checking is the commonest form. To some tastes a driving horse may present a fine appearance if the head be pulled high and back, and the consequent restless tossing of the head may give a spirited appearance, but the custom is a silly one after all. Over-checking pulls the horse's head into a strained, unnatural position which is far from beautiful. There is nothing more attractive than the dignified arch of a spirited horse's neck, nor the proud way in which he carries his head. The man who over-checks his carriage horse thinks he is helping it to keep to this graceful position—which is just what he is not. A single glance in comparison ought to be enough to convince anyone.

Moreover, pulling the head back in this unnatural way takes away much of the steed's pulling power; try it on yourself and see how it works.

If a horse does not naturally hold his head high it is because he is underfed, overworked, or in bad health. The assistance of the veterinary is needed and not that of the check rein.

Docking the horse's tail needs little comment. The operation required for a real dock is painful, and, in any case, the shortening of this natural protection against flies is an unnecessary sacrifice to a mistaken idea of good looks. The fly net does away with the annoyance to the horse, but it does not remove the lack of symmetry. Certainly a long silky tail is much more graceful than a stub, no matter how "natty" it may look.

Many drivers are too careless of the horse's welfare to see the needless cruelty of the tight nosebag. There is no economy in this, even if the extra large nosebag spills a few oat grains. Less food, eaten in comfort, will do more good than a generous feed which causes the horse to gasp and choke.



Devon Cow

The Devon comes from Devonshire, England. Its value rests less upon quantity of milk it yields than upon its superior quality.



Model Horned Cow.

The Model Horned Cow stands high among dairymen as a good breeder and as a continuous and large milk producer.



Jersey Cow.

The Jersey, coming from Jersey, England, a small-sized animal, stands pre-eminent for richness of milk and the butter which it produces.



Texas Steer.

The Texas Steer descends from cattle imported into Mexico from Spain in the 16th century. A prolific inferior breed on southwestern plains.

CATTLE

DIFFERENT BREEDS



BEST FOR MILK AND BUTTER

Records of the Best Milk and Butter Production

Cattle and their uses are mentioned in the oldest books of the Bible. It is probable that the domestic ox is a native of Europe, Asia and possibly of Africa.

There are many breeds of cattle in England and in the United States. Each has its admirers. We mention here twelve of the well known and popular breeds.

Devon Cattle

The Devon is one of the original breeds of English cattle. They are red in color, symmetrical in form, and distinguished for beauty. They are superior milkers, have a fine flesh, make excellent oxen, and are recommended to farmers as an all around breed highly valued for milk, beef, and for work, as oxen, on the farm.

The Model Horned Cattle

The Model Horned Milk Cow is not supposed to belong to any special breed, but illustrates in her make-up and appearance a mixture of good blood and excellent traits. One, described as half short-horn and half Devon, gave milk twelve years in succession and bred many calves.

Jersey Cattle

The Jersey Cow. This prime animal, for dairy purposes, was first reared in Normandy, in France, but was carried to the islands of Alderney and Guernsey, in the British Channel, and there reached its present position, as a distinct and valuable breed. Its popularity may be judged by the fact that more than 4,000 head are annually exported from the islands to this and other countries.

In appearance and in those traits which make up a genuine and attractive dairy cow, the Jersey is rather below the medium size, yet pleasing and satisfactory. No excellence is claimed for it beyond the richness of its milk, and the butter which it produces; but in these it stands pre-eminent, and as a household pet is not surpassed for gentleness.

Texan Cattle

The Texas Steer is a descendant of cattle imported into Mexico from Spain in the 16th century. It is prolific and numerous, and is kept in enormous herds on the plains where it is caught and shipped.

As a whole it is an inferior breed of cattle, raw boned and shambling in appearance, with long and slender horn curving backward over the head which is of medium size.

Holstein Cattle

The Holsteins. This breed, introduced into this country from Holland, has been a favorite in the dairies of that country for hundreds of years. They are large in size, black and white in color, and are great milkers in quantity and quality.

Originally this breed was white in color. About the year 200 B. C. a tribe of people, called the Batavians, brought into Germany a breed of black cattle and settled along the Rhine. The combination of these two breeds produced the black and white breed of Europe.

These cattle were imported into this country, about the year 1625, by the early Dutch settlers. The first cow, supposed to be a pure blood of this breed, was imported into the United States in 1852. This breed is noted for marvelous milk production, powerful digestion and perfect assimilation of food.

There are numerous records of cows of this breed producing 30,000 pounds of milk a year, and instances have been recorded where a cow of this breed has produced, in one year, as much as 30,000 pounds of milk. They are large in size and, next to the Jerseys, the Holsteins are greatest in numbers in the United States.

Ayrshire Cattle

The Ayrshire, though coming from Scotland, its origin is not certainly known. It is a superior animal of strong constitution, highly prized for the excellence and amount of its milk. It excels, also, as a yielder of good butter.

Wedge-Shaped Dairy Breeds and Rectangular Beef Cattle



Holstein Cow.

The Holstein, a native of Holland, is highly esteemed for dairy uses and for market purposes. Large in frame but compact in structure.



Ayrshire Cow.

The Ayrshire, a native of Scotland, is highly prized for amount of milk and as a yielder of good butter.



Holderness Cow.

The Holderness comes from Yorkshire, England. Belongs to the Short-Horn family and is classed among the best of dairy cows.



Model Polled Cow.

The Model Polled, a hornless cow, descends from Norfolk and Suffolk counties, England. Does not fat easily but excels in rich milk.

Holderness Cattle

The Holderness Cow, which is classed among the best of dairy cows, came to us from Yorkshire, England, where it has existed for a long period. It was imported into this country about 1818 or sooner.

It belongs to the Short-horn family, is of medium size, color varying from deep red, with white line, back and belly, to a chocolate and black body and black legs.

The breeding in-and-in system, resorted to in the propagation of this animal, has resulted in an excellent and vigorous progeny.

Model Polled Cattle

The Model Polled Cow has been a favorite among citizens of New Jersey, in the vicinity of Philadelphia, on Long Island, N. Y., and in other parts of the United States.

Guernsey Cattle

The Guernseys, like the Jerseys, are a channel island breed, having originated on an island in the English Channel.

Both the Jerseys and Guernseys have been developed as dairy cattle. The Guernsey is larger than the Jersey, is coarser in bone and carries more flesh.

Next to the Jersey, the Guernsey produces the richest milk. In quantity the Guernsey yield often exceeds that of the Jersey.

Years ago the Jerseys and Guernseys were classed together and were known by the general name, Alderney. But later they have been recognized as separate breeds.

The Guernsey is an ideal family cow, color light yellow, reddish or fawn, a light feeder, but rich in milk production. The "Dolly Bloom," a Guernsey cow, has a record of having produced in one year 17,207 pounds of milk.

Hereford Cattle

The Hereford takes its name from its native district Herefordshire, England, where it has flourished for the last one hundred years. As a milker it does not excel, but in the market shop it is good beef.

Larger than the Devons, and easily fattened, it is greatly esteemed, either unmixed or for crossing with inferior stock.

Galloway Cattle

The Galloway. This animal is noted for a hornless head, the result of cultivation.

Though not a prolific milker its milk is rich in quality and yields a large proportion of butter. In colors, black and brown, it originated in Southwestern Scotland.

Short-horn Cattle

Short-horn Heifer. This is one of the most admired breeds of cattle in the United States.

It is very large in size, weighing from 750 to 2,200 pounds, is principally raised for beef, which is of excellent flavor; fattens easily.

As a milk cow it yields from six to eight gallons a day, and from 12 to 18 pounds of butter weekly.

The principal distinguishing mark is its short horns, which curve forward and slightly downward from the upper level of the head.

The Latest Milk and Butter Production

By Champion (Guernsey) Cow

KIND OF FOOD GIVEN THE COW, AMOUNT OF FOOD, HOW FED, Etc.



Galloway Cow.

The Galloway, originated in Southwestern Scotland. Hardiest animal, milk rich in quality and yields a large proportion of butter.



Short-Horn Heifer.

The Short-Horn Heifer, one of the most admired breeds, comes from England, is excellent for beef and is a large butter producer.



Hereford Cow.

The Hereford, from Herefordshire, England, is valued highly for market purposes, fattens easily and is of good class.

A few years ago a record of more than a thousand pounds of butterfat in 365 days was thought to be impossible, but a record of 1,050.59 pounds of butterfat produced in a year won the championship, for the Guernsey, May Rima, a seven-year-old cow, which in an official test finished in April, 1914, exceeded by 20 ounces the record of the Holstein, Hanostine Belle De Kol. The Jersey record of just 14 ounces less than 1,000 pounds is held by Sophie 10th.

It is interesting to note that the record-breaking Guernsey, as well as her sire and dam, are American bred cattle.

A few other facts with regard to this Pennsylvania-bred cow and her treatment during the test. Her weight is near the 1,300-pound mark; she gained flesh during the trial.

Rations during the test: She was given practically the same ration during every month of her high production. She received eighteen pounds of the following grain mixture daily:

250 pounds of bran 50 pounds of hominy feed
100 pounds of gluten feed 50 pounds of oil meal
50 pounds of cottonseed meal.

In addition to this she had three pounds of molasses and three pounds of dried beet pulp daily. The ration was divided into three feeds. For roughage she had all the alfalfa, clover hay, and corn silage that she cared to eat. The usual consumption of silage was thirty pounds a day. To make up for the rather small amount of silage she got away with a daily allowance of sixteen pounds of carrots.

This Guernsey was fastidious. She ate only those feeds that particularly pleased her—which helps to account for the good results. She refused to eat home-grown alfalfa, preferring the clover hay and Iowa alfalfa.

Another feed that she would not have on her menu was beets, carrots suiting her much better. When silage was put in the feed-box she picked out the tenderest parts and left the rest. She drank, it is estimated, about twelve twelve-quart pailfuls every twenty-four hours (about 300 pounds) of water.

The herdsman who milked the cow lived in a little cell right alongside the big box-stall, alert to the slightest change. By the use of a small stove and window ventilators he kept the temperature nearly uniform—from sixty to sixty-five degrees. Every day from April seventh to April seventh he milked the cow at four in the morning, at noon, and at eight o'clock at night.

Perhaps with similar care and considerate treatment, the yield of the average cow would be brought up to something over half of this champion's record.

May Rima was sold at Edward B. Cassett's sale of blooded Guernseys, at Devon, Pa., Aug. 29, 1914, to John P. Crozer of Upland, Pa., for \$5,010.

The World's Record

June, 1914.

	Pounds.
Guernsey, May Rima:	
Milk produced in 365 days.....	19,639.59
Butterfat produced in 365 days.....	1,050.59
Butter (85 per cent fat) produced in 365 days.....	1,364.00
Milk produced in best month.....	1,839.90
Butterfat produced in best month.....	103.03
Average test.....	8.4 per cent fat
Highest test, one milking.....	9.9 per cent fat

Other Records

	Pounds.
Previous 365-day butterfat record—Hanostine Belle De Kol (Holstein).....	1,058.34
Previous Guernsey butterfat record—Daisy Pearl.....	957.35
The Jersey yearly butterfat record—Sophie 10th.....	899.14
The Ayrshire yearly butterfat record—Auchinbrair Brown Kate, 4th.....	917.00
Present World's butterfat record for seven days—K. P. Pontiac Lass (Holstein).....	35.32
Present World's record for milk production in 365 days—Creamelle Vale (Holstein).....	29,591.40

Sterilized milk or cream, properly speaking is that in which all the germs have been destroyed (usually by repeated heating to 212° F.—boiling point), but in dairy practice the term is applied to milk or cream which has been heated once to a temperature of about 212° F.

Butter.—An oily substance obtained from cream or milk by churning. Agitation separates the fat or oily part of milk from the thin and curdy part, called buttermilk. The word comes originally from the Greek "bous," ox, cow, and "tyros," cheese.

Whole milk is one in which the ratio of protein to other constituents is high, i. e., comparatively poor in protein.



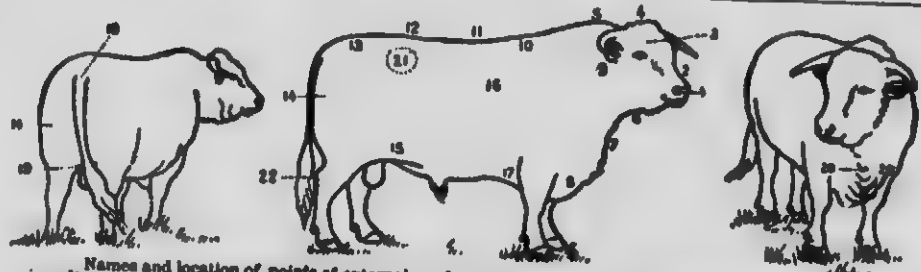
Guernsey Cow

The Guernsey, from the island of Guernsey, England, like the Jersey, is noted for its rich milk and excellent butter.

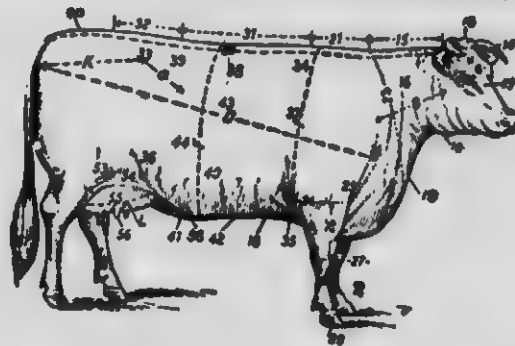
Tuberculin is a liquid in which the germs of tuberculosis have been grown but from which all live germs of the disease have been carefully removed. It is administered by hypodermic injection as a test for tuberculosis in animals, a rise of temperature after injection indicating the presence of the disease.

Bedding. Material used for stock to sleep on in the stable, with to keep the animal clean and to save valuable fertilizing ingredients from being lost. Cut straw, like any best, sawdust and shavings make more valuable bedding than straw, since they absorb water better and there is apt to be less waste of liquid manure.

Names of Points Describing Cattle



Names and location of points of external conformation of beef cattle. 1, muzzle; 2, face; 3, forehead; 4, poll; 5, crest; 6, throat; 7, dewlap; 8, brisket; 9, neck; 10, crops; 11, back; 12, loin; 13, rump; 14, thigh; 15, flank; 16, fore ribs; 17, fore flank; 18, setting on of tail; 19, twist; 20, breast; 21, hip; 22, hock. (Mumford.)



Points and measurements to be observed in judging beef cattle.

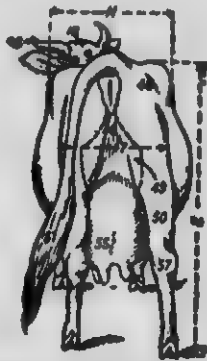
NAMES OF POINTS.

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|----------------------------------|--|--|
| 1. Mouth. | 15. Neck. | 25. Arm—portion of leg between shoulder and knee. |
| 2. Lips. | 16. Neck—lateral view. | 27. Knee. |
| 3. Nostrils—air passages. | 17. Breast or bosom—front of chest. | 28. Cannon or shank—bone between knee and ankle in fore or hind leg. |
| 4. Muzzle—nose. | 18. Fore flank—rear of arm. | 29. Hoof. |
| 5. Face—from muzzle to poll. | 19. Dewlap—loose skin underneath the throat. | 30. Spinal column—backbone. |
| 6. Forehead—from eyes to poll. | 20. Brisket—point of chest. | 31. Barrel or coupling—middle piece. |
| 7. Eye. | 21. Withers—top of shoulders. | 32. Loin—muscle covering the short ribs. |
| 8. Cheek—side of head below eye. | 22. Shoulder point. | 33. Hooks or hips. |
| 9. Jaw. | 23. Neck or collar—depression in front. | 34. Crops—depression behind shoulder. |
| 10. Throat. | 24. Elbow. | |
| 11. Brains. | 25. Chest—cavity inclosing vital organs. | |
| 12. Poll—top of head. | | |
| 13. Horns. | | |

Points in Judging Dairy Cattle

TO ALL PEOPLE DEALING EXTENSIVELY IN CATTLE

To Know the Points Is Very Important



Points and measurements to be observed in judging dairy cattle.

VALUES OF POINTS—continued.

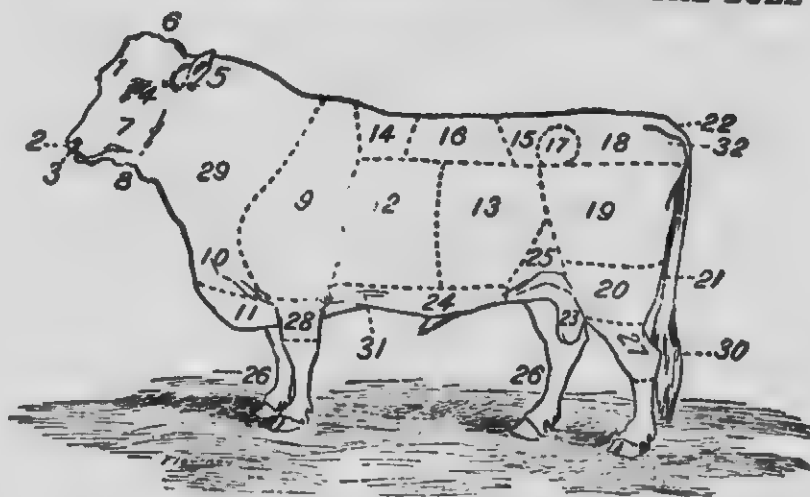
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| 44. Girth at heart. | 45. Abdominal depth, indicating digestion and constitution. | 51. Brisk. |
| 46. Girth at flank. | 46. Tail head. | 52. Thigh. |
| 47. Fore ribs. | 47. Pin bones. | 53. Stifle. |
| 48. Chime—between withers and loin. | 48. Buttocks. | 54. Flank. |
| 49. Fides or floating ribs. | 49. Escutcheon—covered with fine hair. | 55. Udder. |
| 50. Belly. | 50. Twist—where hair turns on thigh. | 56. Teats. |
| 51. Milk veins—branched and tortuous ducts running forward beneath the barrel. | 51. Gaskin or lower thigh. | 57. Hock. |
| 52. Orifices through which the milk veins enter the abdominal walls. | | 58. Navel or umbilicus. |
| | | 59. Dish. |
| | | 60. Pelvic arch or sacrum—the arch bone between the loin and crupper. |

ANIMAL MEASUREMENTS.

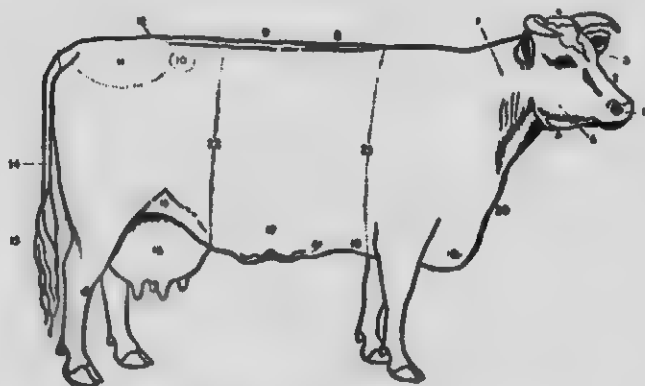
- | | | |
|---|-------------------------------------|---------------------------------|
| A. Width of forehead. | B. Height at withers and hooks. | G. Length of barrel depression. |
| C. Length of neck. | F. Girth at gore, flank, and navel. | H. Width of hooks. |
| D. Width of breast. | | I. Length of hind quarters. |
| E. Length from pin bones to shoulder point. | | L. Circumference of udder. |

General Outline Description of Cow

NAMES OF THE DIFFERENT POINTS OF THE BULL



- Names of points.
- | | | | |
|-----------------------|----------------|-------------------|--------------------|
| 1. Forehead and face. | 9. Shoulders. | 17. Hooks. | 25. Flanks. |
| 2. Muzzle. | 10. Chest. | 18. Rumps. | 26. Legs and hams. |
| 3. Nostrils. | 11. Brisket. | 19. Hindquarters. | 27. Hocks. |
| 4. Eyes. | 12. Fore ribs. | 20. Thighs. | 28. Forearms. |
| 5. Ears. | 13. Back ribs. | 21. Twist. | 29. Neck vein. |
| 6. Poll. | 14. Crops. | 22. Base of tail. | 30. Bush of tail. |
| 7. Jaws. | 15. Loins. | 23. Cod piece. | 31. Heart girth. |
| 8. Throat. | 16. Back. | 24. Underline. | 32. Pin bones. |



Names and location of points in external conformation of the cow.

1, muzzle; 2, face; 3, forehead; 4, poll; 5, lower jaw; 6, cheek; 7, neck; 8, back; 9, loin; 10, hip or hook; 11, rump; 12, pelvic arch; 13, switch; 14, thigh; 15, flank; 16, udder; 17, barrel or belly; 18, fore flank; 19, brisket; 20, dewlap; 21, heart girth; 22, loin girth. (Mumford.)

CRUELITIES INFLICTED UPON CATTLE

Good Treatment Means Better Stock and More Milk and Butter.

Because a cow does not appear in public quite as much as a horse, the abuses it has to endure have not received as much attention. Fortunately, of late years the government and the various agricultural colleges have been educating the farmer to see the business value of right treatment for stock. Cleanliness, protection from inclement weather, sufficient food and water, and kindly treatment have been demonstrated to have a direct bearing on the commercial value and productivity of stock.

In the case of milch-cows it goes without saying that the amount of milk, as well as its richness, is directly proportionate to the attention given to the animal. Every farmer realizes that his herd must be given milk-producing food of the right quality and quantity. He knows that the animal must be kept clean in order that it may be healthy and the milk free from disease. He knows that extreme cold and exposure cut down the yield of milk at once, and—if he is observing—he quickly realizes that mistreatment impairs both the quality and the quantity of the milking.

Most of the ill-usage of cattle is due to carelessness or shiftlessness. Nine times out of ten the prosperity of the farmer can be judged by the appearance of his cattle—and justly, for his herd may be made a big source of profit. Filthy barns, drafty and leaky, boggy barnyards, tainted water supply, have no place on the up-to-date dairy farm. Good clean bedding, well kept mangers, right kind of ventilation, coupled with protection from the weather, mean increased milk of superior quality. The farmer's pocketbook, as well as his heart, should prompt considerate treatment of his stock.

Cattle raised for market are commonly subjected to cruelties while in transportation. Legislation has remedied many of the abuses practiced in earlier days, and watering and feeding en route is compulsory at proper intervals. Overcrowding, especially where cattle are not dehorned, often results in injured stock, and always in loss of weight. The loss of weight on a long journey is almost unbelievable, and no stock raiser of good judgment increases this purposely by wanton cruelty. An animal less in the car at the beginning of the shipment is better than two or three less at delivery. The common custom of shipping calves by wagon, with feet bound together and heads hanging over the side is too inhuman to need more than mention. "How would you like it yourself?" ought to be the question every shipper asks himself. It would do away with much barbarity.

LARGE SHEEP FOR MUTTON

SHEEP

FINE WOOL SHEEP FOR FINE CLOTHING

THE DIFFERENT BREEDS OF SHEEP

The sheep was doubtless the first animal domesticated by man. It is frequently alluded to in the Bible. Abraham and his descendants were shepherds. Wild sheep are found in the mountainous regions of various parts of the world. The Big Horn is found in the rocky regions of North America.

The original wild sheep is said to be a native of Asia and from that country came to this, possibly, by way of ice across Behring strait. The wild sheep is clothed with short wool, having an outer covering of long hair. The effect of domestication has been the disappearance of the outer hair and an increase in the length of wool.

Today the domesticated sheep are found wherever we find man. The various breeds are numerous and

the manufacture of wool into the different kinds of cloth and the changing of the cloth into various articles of wearing apparel are among the largest industries on earth.

Sheep raising is one of the important departments of agriculture, claiming attention in all the mountainous regions of the United States. It is a very profitable feature of farming, sheep being valuable for food, while being sure to yield a valuable fleece necessary in the manufacture of clothing.

As one of the prime necessities wool is always in demand. To make sheep raising highly profitable it is only necessary to provide the flock with fair pasture, with shelter against inclement weather, protection against wolves and sheep-killing dogs.

Success in Sheep Raising

Having determined to go into sheep raising the immediate rule to adopt is to get the best of the breed selected.

Much will depend on the ram. He should be a thoroughbred. Common sheep bred to him will be greatly improved in their progeny. He should be kept apart from the ewes, stabled at night and well fed with grain. The ewes should be admitted

to him singly and but once each. Carefully treated thus a ram will be able to serve fifty or sixty ewes in a season.

Ewes should not be bred from until two years old. If spring lambs are being raised for early market the time for lambing must be arranged accordingly. The period of gestation with sheep is five months.

Feeding and Care of Sheep

From the illustrations we have given and description of the different breeds the farmer will determine for himself whether sheep raising for wool or for mutton is the most profitable.

If near a large city with the advantage of a close-by market he may find it most profitable to raise sheep and lambs for market. If located many miles from a market place, with a hilly, mountainous region favorable for pasturage, he may find it best to devote all his energies toward raising sheep

solely for wool. In that event whether it shall be a fine or a coarse wool, he must determine by market conditions, and his facilities for caring for a large flock.

If intending to go extensively into sheep raising it will be well to make careful study of the subject, procuring the best books treating on sheep husbandry in the meantime visiting large sheep owners and studying their methods of management to acquire knowledge of successful sheep farming.

Effect of Crossing Breeds

The Farm and Home Encyclopedia, under the editorship of H. R. Allen, gives the following concerning sheep raising. "The following crosses upon common sheep have been recommended for several purposes indicated. A cross of Cotswold will increase the length and quality of the fleece and largely increase the weight of carcass over that of the common ewe. A cross of Southdown will greatly improve the quality of the mutton, increase the quantity, thicken the fleeces somewhat, and give it some additional weight.

A cross of the American Merino will materially increase the weight and quality of the fleeces. The size of carcass will not be much increased, though improved in symmetry.

The Ewe During Pregnancy.—During pregnancy the ewe should be well cared for, and those expected to drop their lambs early in the spring closely watched. As the time approaches for parturition the ewe should be separated from the flock and placed in comfortable quarters. Ewes should be well fed during their entire pregnancy, but not kept fat. They should also have exercise.

Protection of Ewe and Lamb.—The ewe should have a dry, warm place, where she and her newly-born lamb can be protected from wet and cold. A shed enclosed so as to shut off the wind will answer. If the weather is very cold protection should be something warmer. If the lambs come later in the season—and for the general flock about the first of

May is the best time—less shelter and less care generally will be required. The main thing at any time is, to prevent either the ewe or the young lamb from becoming chilled.

The Young Lamb.—After the lamb is dropped the ewe will generally lick it dry. If, however, she refuses to do this, it should be carefully wiped dry. The lamb will soon attempt to suckle; if it does not, it should be assisted. If the ewe refuses to own the lamb, she should be held while it suckles. If this is repeated a few days she will own it.

If the lamb is intended for early market it should begin at about three weeks of age. Indian meal or oatmeal gruel may be given it. The ewe, at the same time, should be fed bran, oil cake or oat meal. Heating food like corn should not be given her. The lamb in a very short time may be given oats and hay.

Weaning.—Lambs should be weaned when about four months old. They may be left in the pasture where they have been running with the ewes, and the ewes removed to some other place and be put upon dry food to stop the flow of milk. Their udders should be watched and if they become distended, they should be relieved by milking. If at all feverish they should be bathed with tepid water.

Treatment of Lambs.—In addition to pasturage the lambs should be fed daily a little oats.

General Directions in Care of Sheep

MANAGEMENT OF SHEEP

On Prairie Farms

On prairie farms, or where lumber is high, good shelters may be made by the use of poles and straw, or dry grass. These shelters should open to the south and be made with poles and grass, and should be from six to eight feet high; if from lumber, they may be made as high as the fancy of the farmer or his purse may dictate. They should always have good ventilation. Fresh air is as necessary as warmth. Shelterless flocks may live during the winter, but they will require double the feeding of those kept dry and warm.

Racks or mangers should be placed in the sheds, in which the sheep should be fed. The feed should never be given them on the ground. Where racks are used there should be a tight trough beneath to catch such particles of hay as fall through.

Food and Fattening

Food and Fattening.—Sheep should not be suddenly brought from grass to hay. Feeding should begin on the pastures before the sheep are finally removed to winter quarters.

Hay and small quantities of grain should be given them, the quantity being increased gradually until they are transferred to winter quarters. They should not be permitted to fall off in condition when the change is made and they should be kept in good condition during the winter. Good feeding and care during the winter will add to the weight of the next year's fleece. The best food for sheep during the winter is good hay and corn, with straw and roots occasionally.

Sheep Thrive the Best

Sheep thrive the best on a variety of food. Old maul makes an excellent food during the winter. Clover hay is regarded by many as much superior to any other kind. Wheat bran is also esteemed by many as a desirable food, to be given with corn. Sheep intended to be fattened for spring market, when mutton is generally scarce and high, should be kept in good condition during the winter. As spring approaches, their food should be increased. Sheep should be bedded with straw. This is the best way of saving the manure. The bedding should be renewed every day, as cleanliness is essential to the health of sheep. When the weather is very cold the daily average of food should be increased, a larger amount of grain being given.

Salt should be given at least twice a week. Or, what is better still, keep it in the bottom of the rack all the time, so they can get it when they want it.

Summer Management

Summer Management.—As soon as spring opens and the grass begins to appear the sheep will manifest their impatience for the pasture by restlessness and bleating. When the pastures are large and naturally dry they may be turned out as soon as they can find grass enough for a bite if the weather is fine. They should not be permitted to eat too freely of the green food, however, at first, as there is danger of purging them excessively.

If roots be given them for a few days before turning them on pasture it will, in a measure, prepare their systems for the change and the grass will not affect them so seriously. It is also a good plan to bring them into the yards every night and feed them with hay for a week or ten days. After this time the management of sheep is simple and easy during the summer and until the grass begins to shorten in the fall.

Pasturage

With sheep, good pasturage with plenty of water and shade and frequent saltings is all that is necessary. A range of woods in addition to open pasture is desirable, as sheep consume a great variety of weeds and shrubs and will thrive on a diversity of feeds. Some farmers anticipate the drying up of pastures during summer and provide green food by sowing rye or corn broadcast, on which the sheep are turned when the grass becomes short. White mustard has also been used with advantage for this purpose.

The sheep is naturally a shy animal, but is exceedingly docile, and if kindly treated will learn to entertain an affection for its keeper. This will render the management of the flock under all circumstances much easier and more satisfactory than when the sheep are wild. Lambs should be castrated when about four weeks old.

Winter Care

Winter Care.—When winter approaches and the severe frosts of late autumn have diminished the quantity and quality of food found in the pasture, sheep should be brought into winter quarters. They should be removed from the grass before the fall rains set in, as often the ground becomes softened and their continuance on the pasture will injure the health of the sheep and ruin the sod.

Dry Yards

Dry yards and comfortable sheds should be provided for winter. The larger the yards, if dry, the better for the sheep, as they require a good deal of exercise during the winter months. The yards should be made absolutely dog-proof, and in a region infested by wolves, foxes, or other sheep-destroying animals, the fences should be such as to keep them out.

When Large Flocks of Sheep

When large flocks of sheep are raised and they are seen by their keepers during the day it will be necessary to have them protected from dogs and other animals at night. When brought from pasture to the yards, it is a good plan to separate the young and feeble sheep from the stronger ones and keep them in separate yards. This will enable the farmer to bestow special care where it is most needed. Every sheep yard should be supplied with plenty of fresh water. The sheds or shelters attached to each yard should be dry and made with reference to the climate.

Sheep Should Have Shelter

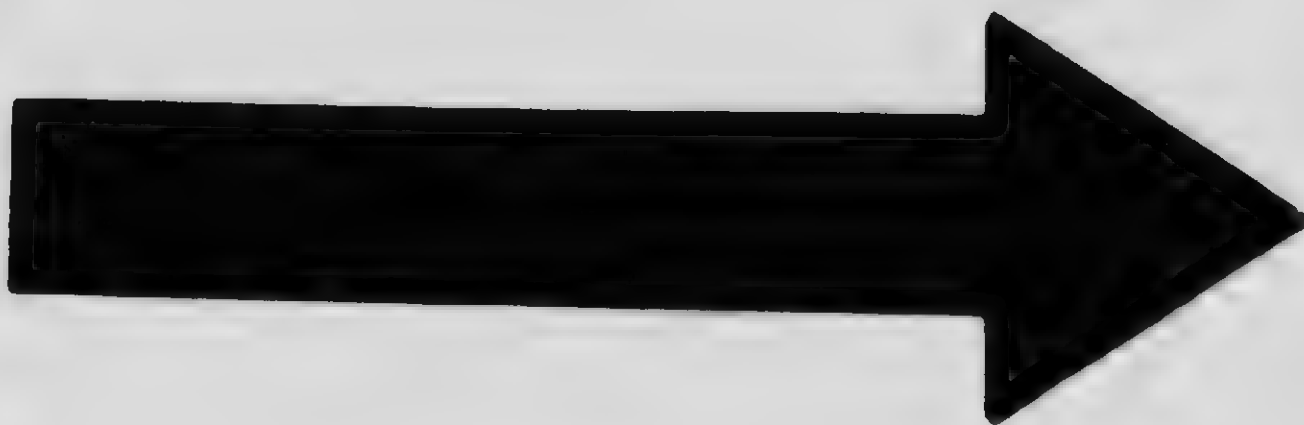
Sheep should have shelter in all climates, but in northern latitudes, where the winters are severe, their shelter should be more than an open shed. They should not only be kept dry, but warm. The shelters should be so constructed that the sheep may come in and go out at will. In regions where timber is plenty and cheap, of course sheds or stalls regularly constructed of lumber are the most desirable.

No domestic animal is more readily affected by adverse circumstances than the sheep, and none has less power to resist them. Therefore, it is urged upon farmers, if they wish to raise sheep with profit, to give them the most careful attention.

Profits of Sheep Raising

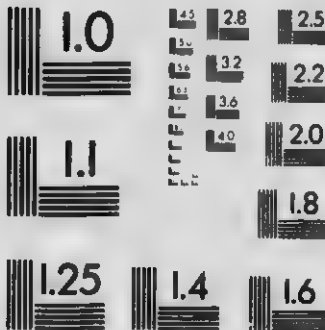
When intelligently followed, the breeding and raising of sheep is one of the most profitable and pleasant branches of general farming. But to make it profitable the farmer must give it the most

vigilant attention. The idea that sheep can take care of themselves better than almost any other domestic animal is erroneous and fatal in its practical workings.



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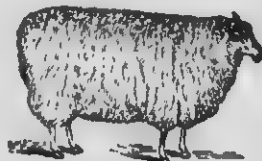
The Different Breeds of Sheep

THE FINE WOOLS AND THE COARSE WOOLS



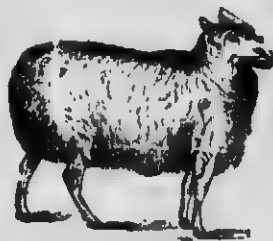
Cotswold Sheep.

The Cotswold yields, generally, a fourteen-pound fleece



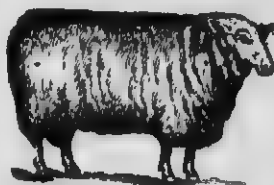
Leicester Sheep.

The Leicester gives a coarse long wool



Cheviot Sheep.

The Cheviot yields a fine wool



Oxfordshire Down Sheep.

The Oxfordshire Down gives Grease of long

Cotswold Sheep

Valued for its mutton and for its annual 14-pound fleece of wool.

This sheep takes its name from the Cotswold hill district of England. It was at first bred upon the hills and fattened in the alleys of the Thames and Severn rivers.

The modern Cotswold is a cross between the original stock and the Leicester. It is valued both for its mutton and wool, the first of which is considered, and the latter yields 14 pounds per head per annum. The weight of the animal varies from 200 to 300 lbs. It has a hardy constitution, thrives well in pasture, has an average increase of 500 per cent. in five years, valued at \$200; is docile in disposition; its cost of keeping is about \$2.25 per head yearly; and prices for bucks and ewes of the best grades range from \$40 to \$60 each. This is the highest price asked for any breed of sheep in this country.

Leicester Sheep

Noted for a 6-inch-long wool which is admirable in the manufacture of knit goods.

The Leicester was formerly an inferior breed existing in mid-England, heavy, large and coarse in wool; but after years of improvement instituted by Robert Bakewell in the 18th century its quality changed for the better.

General Washington introduced the Leicester into this country, and today it ranks nearly equal to the Cotswold.

Its weight ranges from 150 to 200 lbs. The flesh is palatable and nourishing. The yield of wool at a clip is 8 pounds. Its constitution is hardy, its disposition is docile and it is a fair forager. Its average of increase is 500 per cent. in 5 years, valued at \$100. Annual cost of keeping, \$2.25.

The wool is long, averaging at the second shearing, and afterward, six inches. Its coarseness and length prevent its extensive use in the manufacture of woven cloth, but for knit goods it is excellent.

Cheviot Sheep

The Cheviot is a native of Scotland, bred among the Cheviot hills, and ranks well as a middle-wooled sheep.

In its home it is much inferior to the Improved American breeds, somewhat resembling a cross between the Leicester and a common sheep. It is by nature hardy, thriving on poor food and bravely enduring winter storms, fattening under indifferent treatment, and is described by Mr. Spooner as having a white face and legs, an open countenance, lively eyes, large ears, a long carcass, circular ribs, good quarters, legs and body covered with wool which is fine, and yields a fleece averaging 3½ lbs.

Formerly the wool was extensively used for making Cheviot cloths.

Oxford Down Sheep

The Oxford Down is a recent breed established in England from a series of cross breeding and received its name in 1857.

The only claim it has to Down is its color, while its size and wool class it among the long-wooled sheep.

Partaking originally of Hampshire, Cotswold and some Southdown blood its patrons, by interbreeding, have produced this animal, which possesses the advantages of uniform excellence, a hardy constitution, a large frame and a good fleece; fattens easily and yields mutton of superior quality.

A gentleman who first imported it into the United States speaks highly of it, the unwashed fleece weighing 8½ lbs., and the yield of lambs 275 per cent. on the number of breeding ewes. It has an admirable form.

The Different Breeds of Sheep

FINE WOOLS AND COARSE WOOLS

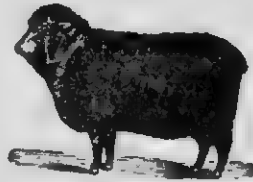
Merino Sheep

Highly valued for its 10 to 20-pound finest white wool

The Merino of today is a descendant of either the ancient Spanish or the Saxon animal. The American Merino, now a distinct breed, is of Spanish origin, and was introduced into the United States about the beginning of this century.

Of medium size but well proportioned, it has a well rounded and full body; weighs from 130 to 150 lbs.; is heavily covered with rolls or folds of the finest white wool of which it yields a clip of from 10 to 20 lbs. and for which it is most greatly valued, its flesh being considered only fair mutton.

It has a hardy constitution; is of the best of foraging sheep; its forehead and cheeks are thickly covered with wool; its legs are short and strong and encased in wool, and like all other sheep it manifests a gentle disposition. Crossing it with inferior stock improves it.



Merino Sheep.

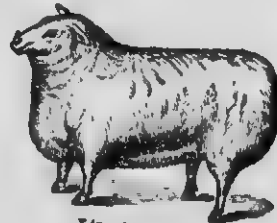
The Merino bears a fine white wool, the fleece weighing from 10 to 20 pounds.

Lincoln Sheep

The Lincoln is another English sheep classed as a long-wool which has been imported into this country and here crossed and recrossed with Leicester and Cotswold breeds until it partakes largely of their respective characteristics.

A ram and ewe of the Lincoln were imported in 1835 from Yorkshire, England. The flock formed of their progeny was generally regarded as very valuable, being hardy in constitution, hearty feeders, and very prolific.

The present animal ranges in weight from 200 to 300 lbs., matures at 2 years; has a hardy constitution; gains an average increase of 500 per cent., yields 11 lbs. of wool annually; is raised both for wool and mutton, the latter of which is good.



Lincoln Sheep.

The Lincoln yields a fleece of long wool.

Fat-tailed Sheep

The fat-tailed sheep demands attention on account of its remarkable peculiarities.

It is undoubtedly derived from Syria, where the early shepherds dwelt with their flocks, but it is now found scattered over a large extent of country.

One of these sheep of the weight of 50 or 60 lbs. will carry a tail weighing 15 or 16 lbs. In cases where it has been carefully fattened until it turned the scale at 150 lbs. the tail has weighed fully one-third that amount.

The tail is broad and rather flat, mostly covered with long wool, as shown in the engraving, and entirely formed of a substance between marrow and tallow; and this, it is said, is used in households instead of butter.



Fat-Tailed Sheep.

The Fat-Tailed has a tail weighing 15 to 16 pounds.

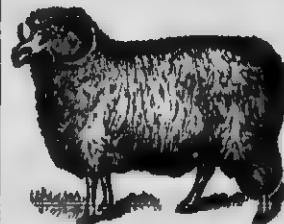
Dorset Sheep

The Dorset sheep is a valuable breed peculiar to Dorsetshire, England, but bearing some resemblance to that of Devonshire.

Most of them, especially of native purity, are entirely white, with a long and broad face, having a tuft of wool on the forehead, the shoulders are low but broad, the back straight, the chest deep, the loins broad, the legs rather long, and the bones small.

They are, as the form of the ewe in the illustration indicates, a hardy and useful animal, furnishing a profitable fleece and well flavored mutton.

The wool is not as good in quality as that of the Southdown, but is intermediate, between the short-wooled Down and the Devon



Dorset Sheep.

The Dorset is a valuable breed.

The Different Breeds of Sheep

FINE WOOLS AND COARSE WOOLS



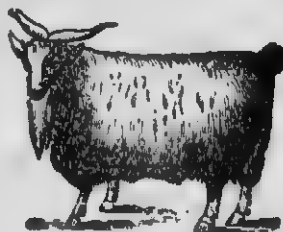
Black-Faced Sheep.

The Black-Faced has a long open wool.



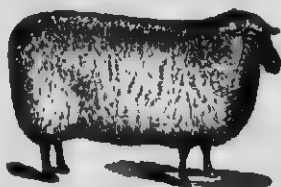
South-Down Sheep.

The South-Down yields a wool used in the manufacture of flannel goods.



Angora Goat.

The Angora Goat, named from the province of Angora in Asia Minor, yields a silky white hair, 8 inches long, from which the mohair shawl is made.



Shropshire Sheep.

The Shropshire is esteemed for mutton.

Black-faced Sheep

Whatever its origin, has been for centuries bred in Scotland, and it is related that one of the Scottish kings kept 5,000 of them for use of the royal household.

The modern specimens have mostly horns with more or less spiral twist, but the ewes are frequently without horns. The faces and legs are either black or mottled; the eyes are wild and fierce. They are covered with wool about the forehead and lower jaw, and the wool generally is somewhat open and long, and coarse and shaggy—not so long, however, but the sheep may be properly classed among the middle-wooled breeds.

They are active and hardy, and endure cold weather better than any other sorts of sheep, except the Cheviot.

Southdown Sheep

The Southdown originated in the southern part of England; is one of the oldest breeds now known and has attained a wide popularity both on account of its excellent mutton and the good quality of its wool.

It belongs to the hornless class of sheep, is of medium size, weighs at 2 years old from 140 to 200 lbs.

Its constitution is hardy; it thrives well in pasture; is docile in disposition and yields 9 lbs. of wool at a clipping.

The wool, which is coarse and light colored, is used in the manufacture of flannel goods. The sheep itself has a good shape, is well proportioned and presents a fine appearance. Crossing with other breeds always improves the stock.

Angora Goat

The Angora goat takes its name from the capital of the Turkish province of Angora in Asia Minor, the mild climate of which has been instrumental in producing the valuable products of this animal—a beautiful, silky, white hair, 8 inches long, and a skin from which fine Oriental morocco is manufactured.

The hair is made into what is known as Turkish yarn, mohair, and then wrought into shawls and camel cloths. Imported into Europe deteriorate the quality of its hair.

At home it is sheared twice a year. It is estimated in 1909 the province of Angora contained a million of these goats, from which the annual yield was 2,700,000 lbs.

Shropshire Sheep

The Shropshire, as its name indicates, is a native of the county of Salop, northwesterly from London, England, and was originally, but is not now, a horned sheep.

Its weight varies from 140 to 200 lbs.; it yields 6 lbs. of wool at the clip; is more esteemed for its flesh than for quantity or quality of its wool and is considered fair eating.

Having a hardy constitution and thriving in pasture, it is an economical sheep.

It was distinguished about a century ago, aside from its horns, by the color of its face, which was either black or brown or spotted. The present breed is more or less mixed with the Leicester, Cotswold or Southdown, and to its native excellence are added many of the good qualities of the sheep named.

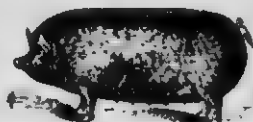
The Morfe is a favorite variety of the Shropshire, which is very numerously bred.

SWINE



Chester White Hog.

The Chester White, a white swine of Chester Co., Pa., weighs, when 18 months old, from 350 to 400 pounds.



Essex Hog.

The Essex, which originated in England, is excellent for bacon, lard and hams, weighs at 18 months, from 300 to 350 pounds.



Berkshire Hog.

The Berkshire, originally from England, weighs at 18 months from 325 to 375 pounds.

Whether or not one goes into the raising of swine on a large scale, it is profitable to keep a few hogs either in small towns or villages, on suburban grounds, or on a farm, since they will eat up the garbage and dispose of the by-products of the dairy, the skim-milk and the surplus buttermilk, in a profitable way.

The hog is normally omnivorous—eats everything. Nature fitted him for using the bread of the forest—roots, herbs, acorns, and natural grasses. But the food should be in good condition.

Innumerable wastes and unused chances to economize let the profit leak away from the average farm. One of the basic principles of profitable pork production is that the hog shall carry to market, in addition to corn, some cheap material, such as clover. The too exclusive use of corn in swine feeding causes a great annual loss to the Middle West.

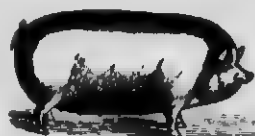
In addition to the feed supplied, there are other benefits from pasturing. Grass is flesh, but the pasture is much more. The hog gains from the soil and from the pasture that cannot be

attributed to protein, fat, or carbohydrate eaten. Minerals from the soil and the exercise required as part of the price of the day's provisions are two of these benefits. On the other hand, the fields are enriched as the hogs are fattened.

No matter to what extent breeding has adapted the hog to concentrates, he still thrives best with some coarse forage. Enough nourishment is obtained from grass, rich in bone and muscle-forming elements, to maintain his body, and the grain given is converted into gain. Nitrogenous concentrates are needed in dry-lot feeding, but grass reduces this need.

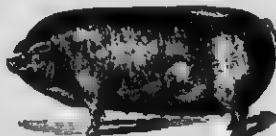
Gains on pasture are made from 20 to 30 per cent cheaper than in the pen, which means usually that they are twice as profitable. Corn worth a dollar fed to hogs in dry lots may readily produce pork to the value of \$1.25, while if fed to hogs on pasture it could as easily be expected to produce gains in weight worth \$1.50, even after making allowance for the value of the pasture.

Weight of Different Breeds of Hogs



Suffolk Hog.

The Suffolk, imported from England, matures at two years and weighs from 300 to 350 pounds.



Poland-China Hog.

The Poland China originated in Southwestern Ohio by crossing native stock with Chinese. Average weight at 20 months 316 pounds.



Jersey Red Hog.

The Jersey Red was first raised in New Jersey. Matures early and weighs from 400 to 450 pounds.

Pastures Are Safer Than Pens

The parasite enemies of swine are most apt to infest small yards and pens. The ravages of cholera, swine plague, and other sicknesses are most readily escaped in the open field. The intestinal tract, distended with grass, is in a more healthful condition, and the heating and fever-starting effects of corn are offset.

Alfalfa makes an excellent hog pasture. It comes early, is abundant, rich, palatable. Everyone cannot produce it, so here is the opportunity for red clover, which ranks a close second, especially during its head-forming period. Alfalfa is more permanent, but both go well in the rotation. Clover should maintain 800 pounds and alfalfa 1200 pounds of

growing hogs per acre, beginning in April, and yet allow for clipping a small yield of hay from one to three times during the season. The money returns are increased thereby, while the tough old stalks are removed and the hog's appetite is stimulated by a tender new growth.

Rape stands highest of the spring-sown forages. Even with abundant clover and alfalfa, rape sown in the small yards and pens used by the hogs in winter will add spice to the ration. This crop is more appreciated with every new trial. Formerly rated as a carbohydrate, it is now known as a liberal provider of protein.

Hogs: Weight at Maturity

Chester White

The Chester White is an American breed, supposed to have originated from the crossing of the Bedford hog with the native white swine of Chester County, Pennsylvania—hence the name. They have been known nearly a hundred years, since 1818, in which year the Bedfords were imported from England. The present excellence of the breed is traced to the careful selection and crossing by the stock-owners of its native country, and it is now considered a well-built and easily fattened animal. Its weight when a year and a half old ranges from 350 to 400 pounds and its price from \$10 to \$25.

Essex

The Essex, now a prime favorite, originated in England and until improved by crossing it with the Neapolitan hog—about eighty years ago—was a coarse black and white animal, large in frame and a slow eater. The result of crossing and breeding in-and-in is a hog of small or medium size, rivaling the Berkshire in fattening and finishing, and in the excellent quality of its hard, bacon, and hams. When a year and a half old its weight ranges from 300 to 350 pounds, and its value from \$10 to \$25. Its fattening qualities are equal to the best of any other breed, and, being a fair forager when at large, it is as economical as any.

Berkshire

The Berkshire was originally, in its English home, of a reddish color spotted with black, and the breed is known to have existed hundreds of years ago. The modern Berkshire is the result of crossing with Siamese, Chinese, and Neapolitan stocks, and it ranks high as a handsome and profitable hog. At eighteen months old its weight ranges from 325 to 375 pounds; its fattening qualities are of the best; its disposition is gentle, its prevailing color is black, its neck short; its back broad and slightly curved, its body of medium length. It is greatly esteemed in England and America.



Chester Hog.

Cheshire

The Cheshire, one of the old English breeds, has been superseded in this country by another of more modern origin, established in Jefferson County, New York, and possessing greatly improved qualities. From that locality it has been widely distributed throughout other portions of the United States, having a good reputation as a stock hog. It has a long body; a long, slender, well-shaped head, with full cheeks; fine, erect, and thin ears; full hams; white shoulders; a thin, pink skin; hair, thin and pure white; fine-grained flesh, and is greatly valued for the amount of clean meat pork it yields in proportion to its offal. The old Cheshire hog is from 3½ to 4½ feet high.



Chinese Hog.

Chinese

The Chinese, unless mixed with better and more profitable breeds, can hardly prove a satisfactory investment for a progressive pork raiser. Crossed with the Polish hog or the Berkshire, great improvement and consequent increased value are attained. There are two varieties, one white and the other black, which differ little in their characteristics. Both fatten easily, and while in most other hogs this is an excellent trait, it adds nothing to the worth of this animal, its meat becoming too greasy for pork and unfit for good bacon. Its appearance is not prepossessing.

Suffolk

The Suffolk, imported from England many years ago, has become a great favorite in this country, but has undergone certain changes. The original breed was long bodied, with a narrow back, a wide head, small hams, and white hair. The modern Suffolk matures before it is two years old and weighs from 300 to 350 pounds. It fattens fairly in pasture or pen, has a hairy constitution, small bones, broad shoulders, a short body, short nose, moderately long hair of a white color, and possesses a docile disposition. The best breed is that produced by crossing with the Chinese or Lincoln.

Poland-China

The Poland-China originated in southwestern Ohio and is the progeny of the native Ohio stock united with the Chinese, Poland, and other swine between 1815 and 1825. By careful selection and cultivation the value and excellence of the breed were maintained and improved by crossing it with the Berkshire and the Irish Grazer, until a very perfect stock has been established. At twenty months old the average weight is about 410 pounds, and for fattening purposes it is reckoned among the best. It thrives well in the fields, having a hardy constitution, is a hearty feeder, and has a docile disposition.

Jersey Red

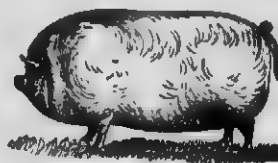
The Jersey Red, first raised in New Jersey, is supposed to be a descendant of the original Polish hog. It reaches maturity early, weighs 400 or 450 pounds, is a good feeder and fattens readily; has a hardy constitution, a long nose, lop ears, a long body, long legs, large bones, long red hair, a heavy tail, coarse, inclining bristles, is sluggish in action, docile in disposition, a prolific breeder, and a fair nurse. The Duroc hog, first well known in Saratoga County, New York, is of finer bone and carcass than the Red, which it resembles in color, while its shape is very similar to that of the Poland-China. It grows to a large size and is very hardy.



Large Yorkshire Hog.

Yorkshire

The large Yorkshire hog, essentially English in origin, has become an American representative of the mammoth race of swine. The unimproved animal was hardy and quite a prolific breeder, but seldom exceeded 800 pounds in weight. Experiments in crossing it with the Berkshire succeeded in producing a hardy, useful hog that fattened too slowly to be profitable. Crossing it with the White Leicester resulted in a large animal with a smaller head than the Yorkshire, specimens of which have weighed from 1,100 to 1,200 pounds.



Small White Yorkshire Hog.

The small White Yorkshire, a native strain of the English Yorkshire hog, is little known to American farmers. The official report of one of the swine breeders' conventions says: "The Yorkshires are the most valuable swine to breed from or to cross with that are obtainable. Size, shape, and flesh are desirable for family or for packers' use, as they have hardy, vigorous constitutions, a good coat of hair, are very quiet, and good grazers, feed well, fatten quickly at any age, and are very prolific."

SEVENTY DIFFERENT BREEDS

POULTRY RAISING

BEST FOR LAYING AND MARKET

Kind of Food, How Feed and Successfully Raise Poultry

Poultry and eggs constitute in the aggregate one of the most important and valuable products of American agriculture. The general consumption of poultry and poultry products by nearly all classes of people furnishes home markets in almost every city and town in the United States, at prices that will return a good profit to those who exercise good judgment in the management of the business.

If you intend to make a business of poultry raising, remember that, like any other business, it will require work as well as good judgment. Not much hard labor will be required after the poultry plant is once established and houses and runways built, but some exertion will be found necessary and the successful operator must also possess ambition and patience.

There is no industry more widely distributed in the United States, nor more generally profitable. The demand for poultry products is almost unlimited. Thousands of farmers' wives clothe the family from the profits of the henry; large poultry plants in countless number pay good dividends, and on every hand, in city and village, are backyard poultry raisers who keep their tables well supplied with eggs and chickens, besides adding to their savings from the profits of the poultry yard. As an American industry it ranks next to corn when its products are figured in dollars and cents.

The poultry business offers large opportunities to the man of small capital and plays an important part in attracting city-dwellers back to the land.

HENS THAT HAVE LAID 217 EGGS AND MORE IN ONE YEAR

ILLUSTRATION FROM MRS. BERRY'S "PROFITABLE POULTRY"

Name of Breed,
Town, Where Laid,
Exhibitor and
Number of Eggs

Silver Wyandotte
Eggs laid, one year, 217
Missouri

White Wyandotte
Eggs laid, one year, 217
Exhibitor, S. L. Todd
Green Forest, Ark.

Single Comb Buff
Leghorn
Eggs laid, one year, 218
Exhibitor,
E. D. Sheldon
Afton, N. Y.

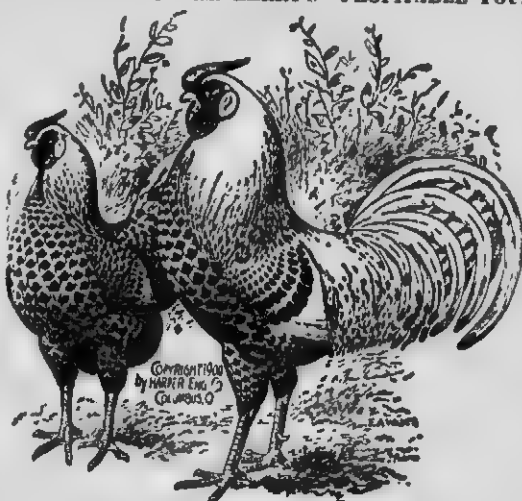
Single Comb White
Leghorn
Eggs laid, one year, 219
Exhibitor, Tom Barron
Cattforth, England

Buff Wyandotte
Eggs laid, one year, 220
Exhibitor, C. H. Rogers
Eagleville, Mo.

Silver Wyandotte
Eggs laid, one year, 220
Exhibitor,
V. G. Warner
Bloomfield, Iowa

Black Langshan
Eggs laid, one year, 221
Exhibitor, Ed. Floyd
Mt. Grove, Mo.

Buff Wyandotte
Eggs laid, one year, 222
Exhibitor, C. H. Rogers
Eagleville, Mo.



SILVER SPANGLED HAMBURG

Black Minorca
Eggs laid, one year, 224
Iowa

Leghorn
Eggs laid, one year, 225
Exhibitor,
Walter Hogan
Petaluma, Cal.

Single Comb White
Single Comb Red
Eggs laid, one year, 228
Exhibitor, Lakemont
Poultry Farm
Winter Park, Fla.

Silver Wyandotte
Eggs laid, one year, 229
Exhibitor,
V. G. Warner
Bloomfield, Iowa

White Orpington
Eggs laid, one year, 232
Kentucky

Silver Wyandotte
Eggs laid, one year, 232
Exhibitor,
V. G. Warner
Bloomfield, Iowa

Name of Breed,
Town, Where Laid,
Exhibitor and
Number of Eggs

Single Comb White
Leghorn
Eggs laid, one year, 233
Missouri

Rose Comb Red
Eggs laid, one year, 235
Exhibitor,
M. L. Puckett
Puxico, Mo.

Ancona
Eggs laid, one year, 236
Exhibitor,
Mrs. Daisy Rose
Bois d'Arc, Mo.

Buff Wyandotte
Eggs laid, one year, 258
Exhibitor,
Crawford & Saylor
Maryville, Mo.

Buff Wyandotte
Eggs laid, one year, 255
Exhibitor, J. H. Clark
West Pawlett, Vt.

Single Comb White
Leghorn
Eggs laid, one year, 258
Exhibitor, Tom Barron
Cattforth, Eng.

Rose Comb White
Leghorn
Eggs laid, one year, 260
Exhibitor,
Jno. S. Gross
Maryville, Mo.

Buildings and Yards

The location and construction of the poultry house are of prime importance, especially on the farm or where the plant is large. Poultry keeping is wholly a business of details and buildings not conveniently located and arranged become expensive on account of unnecessary labor.

As it is necessary to visit poultry houses several times each day in the year, convenience is of more importance than in the case of almost any other farm building.

A dry, porous soil is always to be preferred as a site for buildings and yards. Cleanliness and freedom from moisture must be secured if the greatest success is to be attained. Without doubt, filth and

moisture are the causes, either directly or indirectly, of the majority of poultry diseases, and frequently of failure in the business.

Poultry houses are likely to be more or less infested with rats and mice, unless some means are provided to exclude them, and this should be taken into account in selecting a location. It is generally best to locate the poultry house at some distance from other farm buildings, especially if grain is kept in the latter. Convenience of access and freedom from vermin are the two desirable points to be secured, and they depend largely upon the location. Everything considered, it is safer to have the house quite isolated.

Raising Poultry for Profit. Poultry Houses

The material to be used in the construction and the manner of building will necessarily be governed largely by the climatic conditions. In general, it may be said that the house should provide warm, dry, well-lighted and well-ventilated quarters for the fowls. In order to meet these requirements it will be necessary to provide a good roof with side walls more or less impervious to moisture and cold, suitable arrangements for lighting and ventilating, and some means for excluding the moisture from beneath.

Where permanent buildings are to be erected, some provision should be made to exclude rats and mice, and for this reason, if for no other, the structure should be placed on cement walls with foundation below the frost line.

It is essential to have the different pens or divisions in the house so arranged that each one will receive as much sunlight as possible. Each pen in the building should have a separate yard or run, and a pen should not be made to accommodate more than 50 fowls, or, better still, from 30 to 40.

In all poultry houses in cold latitudes the windows should be placed in such a position that they will give the most sunshine on the floor during the severe winter months. A very common mistake is to put in too many windows. The windows should not be large nor more than one to every 8 or 10 feet in length for a house 12 feet wide, and set about 17 inches from the floor, or at such height as to throw the greatest amount of sunshine on the floor. Sunshine is required both to keep the house dry and to destroy various forms of infection.

FROM MRS. BERRY IN "PROFITABLE POULTRY"

BUILDINGS AND NECESSARY EQUIPMENT.

You must provide good shelter—not necessarily costly or luxurious, but good warm houses of some kind. They can be made of straw, slough hay or sod, and many a thoroughbred chicken has been reared in quarters made of this material and brought their owners good profit. But it is not necessary to use cheap building material or temporary arrangements long, as poultry will soon pay for good substantial houses. We think the most economical kind of a house to build is one that is similar to several we have built on the Golden Rule Poultry Farm. We have examined lots of plans and have seen lots of different styles of houses and have also studied the matter quite a bit. And, from a practical standpoint, you can have them any length you wish, making them 16 feet wide, which we have found to be the best. We show an illustration of one of these houses on this page. These are the dimensions and kind of lumber to use:



Height of front, 4 ft.; back, 6 ft.; highest point in center, 10 ft.; from highest point to where the roof joins the building, 3 ft.; studding and rafters every 2 ft. apart; sill, 2x6, laid flat on foundation. Spike stud-

ding to sill. Make window size to suit yourselves. Often they may be procured cheaply from some one taking out of their dwelling and putting in larger ones or replacing the old fashioned small lights with the modern larger ones. Yellow pine is cheaper for dimensions lumber; fir or white pine for siding.

POULTRY HOUSE USED BY EXPERIENCED POULTRY KEEPER

Some means of ventilating the building should be provided, preferably a ventilator that can be opened and closed at the will of the attendant. This can be located in the highest part of the roof and operated by means of cords or chains.

Perches and Nests

Perches should be not more than 2½ feet from the floor, all of the same height and set firmly but movable. A 2 by 3 scantling set edgewise with the upper corners rounded makes a satisfactory perch.

Underneath the perches should always be placed a smooth platform to catch the droppings. This is necessary for two reasons: The droppings are valuable for fertilizing purposes and ought not to be mixed with the litter on the floor; then, too, if the

droppings are kept separate and in a convenient place to remove, it is much easier to keep the house clean than when they are allowed to become more or less scattered by the tramping and scratching of fowls.

In constructing nest boxes three points should be kept constantly in mind: (1) The box should be of such a nature that it can be readily cleaned and thoroughly disinfected; if it is removable so that it can be taken out of doors, so much the better. (2) It should be placed in the dark, or where there is only just sufficient light for the fowl to distinguish the nest and nest egg; (3) There should be plenty of room on two or three sides of the nest.

Nests for Leghorns or Hamburgs may be made of 6-inch fence boards nailed together so as to form boxes 8 by 10 inches and 6 inches deep. Where perches are arranged with the platform underneath to catch the droppings, as previously described, the

Raising Poultry—Natural and Artificial Hatching

FIRST EXPERIENCE



Young Fowls, Lately Arrived.

BEGINNING ACTIVITY

nests may be placed on the floor underneath this platform, the opening in front closed with a door which either lets down from the top or lifts from the bottom.

Selection of Breeds

A mistake is often made in selecting fowls of a breed that is not suited for the purposes for which they are to be kept. If egg production is the all-important point, it is a most serious mistake to select a breed of fowls that is not noted for this product. If, on the other hand, meat is the chief object, an expensive mistake will be made if any but the heavy-bodied fowls are chosen. The small, active, nervous egg-producing breeds can not compete with the larger phlegmatic Asiatics for meat production.

Then, too, if fowls are kept for both eggs and meat production, some breed of the middle class should be chosen. These, while they do not attain the great size of the Asiatics, are sufficiently large to be reared profitably to supply the table with meat and, at the same time, have the tendency for egg production developed sufficiently to produce a goodly number of eggs during the year. The Wyandottes and Plymouth Rocks are good illustrations of this class of fowls. While individuals of these breeds have made excellent records in egg production, the records of large numbers do not compare favorably with the egg production of the Mediterranean fowls. All of the so-called Mediterranean fowls have a great tendency toward egg production and require only the proper food and care to produce eggs in abundance.

Feeding of Fowls

In feeding for egg production a valuable lesson may be learned from nature. It will be observed that our domestic fowls that receive the least care and attention, or, in other words, whose conditions approach more nearly the natural conditions, lay most of their eggs in the springtime. It is our duty, then, as feeders, to note the conditions surrounding these fowls at that time. The weather is warm, they have an abundance of green food, more or less grain, many insects, and plenty of exercise and fresh air.

Then, if we are to feed for egg production, we will endeavor to make it springtime all the year round; not only to provide a warm place for our fowls and give them a proper proportion of green food, grain, and meat, but also to provide pure air and plenty of exercise.

Persons who keep only a small flock of hens, chiefly to provide eggs for the family, frequently make a mistake in feeding too much corn. It has been clearly proven by experiment that corn should not form a very large proportion of the grain ration for laying hens. It is too fattening, especially for hens kept in close confinement.

When comfortable quarters are provided for the fowls, the nutritive ratio of the food should be about 1 to 4; that is, one part of protein or muscle-producing compounds to four parts of carbohydrates or heat and fat producing compounds. Wheat is to be preferred to corn. Oats make an excellent food and, perhaps, come nearer the ideal than most any other single grain, particularly if the hull can be removed.

Ground or soft food should form part of the daily ration; also some kind of green food, especially clover in season; and when the fowls are closely confined, some meat food, like finely-cut fresh bone from the meat markets. But tainted bones should be rejected as unfit for poultry food.

If grain food is fed in any considerable quantities the fowls must also have access to some kind of grit, especially in the winter months when they have no regular access to gravel or other coarse

gritty substance. Crushed oyster shells supply not only the grit, but also lime for the production of egg shells.

Incubation

The theory of incubation, or hatching, is based upon the fact that if a fertile egg is kept for a sufficient period of time under certain conditions of heat, moisture, and position, it will be transformed into a healthy fowl.

Natural incubation is dependent upon the instinct of the mother hen. Artificial incubation, or hatching by machinery, is a very old idea. Eggs were hatched by artificial means centuries ago. Machines were used successfully for this purpose by the Egyptians long before the Christian era, and some of these ancient hatching ovens that have been brought to light in recent years by explorers used lamps to provide the necessary heat.

The period of incubation varies with different species of fowls. The average period of natural incubation is a little over twenty or about twenty-one days for the egg of the common hen. This period may be somewhat shortened or prolonged



Hatching Chickens by Hen.

by variations in the conduct of the mother hen, and possibly by changes in the weather.

Should the weather be moderate and the hen quiet and faithful, we need not be surprised if the eggs are all hatched by the close of the twentieth or even the nineteenth day. Again, if the weather be extreme or the hen restless and neglectful, we need not look for all the eggs to hatch until the close of the twenty-first or the beginning of the twenty-second day.

The same applies to eggs from other fowls, except, of course, that each has its own period of incubation, subject to the same variations.

Most poultry men agree upon the following number of days as the correct period of incubation for the fowls named: Common hen, 21 days; pheasant, 25; common duck, 28; peafowl, 28; guinea fowl, 25; goose, 30; partridge, 24; Barbary duck, 30; turkey, 28.

In spite of all notions to the contrary, the process of hatching can be suspended and held in check for several days without total destruction of the germ. This fact is of practical importance and, if remembered, may save the breeder a good hatch when, because of some accident or oversight, a lot of eggs has been left without outside heat

Hatching Chickens by Aid of the Hen—Old Style

**MOTHER
HENS**



**CHICKENS WITH
NATURAL MOTHERS**

and allowed to cool. Such eggs, if placed at a proper temperature, may hatch fairly well, provided this temperature is maintained a few days longer than the usual period of incubation.

A small incubator may therefore sometimes save a hatch when the nest has been deserted by an unfaithful hen.

Hatching Chickens by Hen

In raising poultry on a small scale, it is often unprofitable to operate incubators, and the old, time-honored way of hatching by hens must be used. This is the case where there is no suitable place to set up an incubator so as to preserve a regular temperature; or where it is desired to hatch only a dozen or two dozen chicks at a time.

Sometimes the kitchen is the only place available for setting up a machine, and no poultry raiser can expect good results from an incubator set up in a kitchen of the ordinary kind. The changes in temperature are too great to permit of keeping the egg chamber of the incubator at anything like a uniform degree of heat, even with the aid of a regulator. So when the kitchen must be used, poor hatches may be expected from machines and it will be better to hatch by hen.

Considerable care must be exercised in the selection of the hens for this work. Some are unreliable and soon desert the nest; some are clumsy and break eggs; others are born setters and secure good results. As a rule Plymouth Rocks, Rhode Island Reds, Wyandottes, and Orpingtons make good setters, also other varieties of medium size, but unreliable hens are found in every breed and should be kept off the nests.

A good plan is to set several hens at one time, if the size of your plant permits. You can then turn over the chicks from three or four hatches, say, to two of the hens to brood. The other good setters can be reset and you will have a number of chicks of the same size and age, which is an advantage you will soon learn to appreciate.

The setters should be separated from the rest of the flock and should be kept perfectly clean and free from lice. The nest and all surroundings should also be kept clean during the entire period of incubation. Setting hens require grain food, charcoal, grit, and clean, fresh water, into which a little rusty iron may be dropped to furnish a tonic.

A good broody variety of hen should always be selected. Those mentioned above will, as a rule, show good results as setters. The non-setting varieties, like Leghorns, Minorcas, etc., sometimes show signs of being "clucky," but cannot be depended upon in incubation. Heavy, feather-legged varieties, like the Cochins and Brahmas, should not be used on the nests. They are too clumsy for incubation purposes and are apt to break eggs or trample chicks.

Selection of Eggs

Eggs selected for incubation must be fertile, or hatchable. It is well understood that an egg receives its fertility from the male bird, but the condition of the female at the time of laying has much to do with the hatching quality of the egg. The laying hen must be healthy and properly fed or she cannot produce an egg capable of carrying the germ to a successful hatch. Hens kept in unhealthful quarters or too closely confined are not likely to lay eggs that will produce strong, healthy chickens, if indeed they produce any at all. Hens suffering from disease or infested with vermin may lay, but eggs from such hens will rarely hatch, and even if they do hatch, the chicks will not be likely to mature into vigorous or growthy fowls.

Hence in order to secure hatchable eggs the hens must be healthy, have plenty of outdoor exercise, and be fed upon an assorted or balanced ration. An exclusive corn diet will not promote fertility. Fowls in confinement must have a mixed diet and plenty of grit and bone, with meats, clovers, or other substances in the line of nitrogenous food. They must be kept free from lice and must have plenty of litter, straw, hay, chaff, or leaves in

which to scratch. Fowls having free runs need less attention to diet and are more apt to lay fertile eggs than fowls closely imprisoned.

The number of hens to the male in the breeding pen is a subject of much dispute. With most breeds, however, the largest percentage of fertile eggs is secured by the mating of from ten to twelve hens to one good, vigorous, young male bird.

Even under the most favorable circumstances the eggs will vary and give room for selection. Let the selection be influenced by the average product of the hen or breed. An even, uniform lot, assorted as to size, color and shape, will be apt to give the best results.

Freshness is a prime necessity. While an egg six weeks old may hatch, the chick will be weak and hard to raise. Fresh eggs hatch earlier and the chicks from them are stronger than those from older eggs. As a rule eggs more than 12 days old should not be placed under a hen or in an incubator.

Eggs for hatching should be clean; if not clean they should be washed in tepid water and carefully dried with a clean, soft cloth. It is good practice to stand the eggs in a cool, quiet place, each with the large end uppermost, for a period of twelve hours before placing for incubation. This balances the yolk in the center and locates the air cell.

During storage, eggs for incubation should be partly turned every day. A little attention to these simple directions will make quite a difference in the possibilities of fertile eggs and will greatly augment the percentage of chicks.

It is poor practice to set eggs of more than one kind or breed together, for eggs of different kinds vary in thickness and strength of shell and in the amount of heat and moisture required.

The Nesting Box

A suitable nesting box must be prepared for the setting hen. This should be roomy, so that the hen may be able to change her position on the eggs without breaking any of them, and also deep enough to retain the nesting material. The box should be whitewashed or treated with a disinfectant before use. It is important to keep out lice, mites, etc.

The nest itself may be made of a few inches of damp soil or sods, three inches thick, placed in the bottom of the box and covered with a good thick layer of sweet hay or clean straw.

Now place the nest box in a quiet or secluded place, away from the rest of the flock, so that the hen will not be disturbed in any way. Probably the best plan is to have a small building set apart for the purpose and capable of accommodating several setting hens at the same time. This system possesses many advantages, as it is very advisable to have several broods of the same size and age.

A medium-sized hen can cover from nine to fifteen hen eggs, six or seven turkey eggs, nine to eleven duck eggs, or four to five goose eggs. Bantams can cover on the average eight or nine of their own eggs.

Nest boxes should be made so as to open or close readily. Both the box and nest material, as well as the hen, should be thoroughly sprinkled with insect powder before setting the hen and at intervals of eight days during the period of incubation. The hen should be kept shut up as a rule, and allowed to leave the nest only for feed, water, and the dust bath. The latter should be provided within easy reach of every broody hen. The best form of dust bath is a small box kept well filled with loose fine earth. There is no better way to combat the attacks of lice; in fact, during the winter months the dust box is a prime necessity in every poultry plant.

When the hen leaves the nest for her daily feed, the eggs should be carefully inspected, and broken or soiled ones removed, as foul eggs will seriously affect the hatch.

The setting hen must be fed on clean hard grain and kept supplied with fresh water in a clean vessel. The work of the most faithful setter can be spoiled by neglect or carelessness on the part of the operator. Grit and charcoal, as well as the feed

Artificial Incubation

and water, should be placed near to the nest, so that the "cluck" may find them promptly on leaving the nest.

It is a good idea to test out a lucky hen on dummy eggs before setting her upon the selected eggs. If she returns to the nest and sits closely after being taken off a few times, it will be safe to put in the good eggs.

Reliable setters should be marked so that they may be recognized when they again become "lucky." It pays to keep good setters, sometimes for several years. As a rule, old hens make better setters than pullets. Wild or excitable hens break eggs and make poor setters.

Artificial Incubation

The incubator is an important factor in poultry raising. It may be described as a simple and practical machine, easily operated by any member of the household. But there are so many different kinds or makes of this useful machine that it is impossible to do more than describe the general features common to all. At the present time they are all constructed upon similar principles and along the same lines, and nearly all of them derive their heat from lamps that burn kerosene. In some of the hot-air machines the heat is applied through the medium of heated air, while in others—the hot-water machines—the eggs are supplied with heat from pipes filled with hot water.

In the hot-air incubator a common kerosene lamp is used to furnish the current of hot air which passes over and around the egg chamber and which keeps the eggs at the proper temperature for hatching. Like the hot-water machine, it is supplied with a regulator, which, acting upon a valve or damper, regulates the admission of heat to the egg chamber.

In the hot-water incubator, water is heated and forced through metal tubes over the eggs, thus distributing heat throughout the egg chamber. It is supplied with a regulator which works upon the same principle as does that of the hot-air machine.

The important parts of an incubator are the lamp, including oil reservoir, burner, wick, and chimney; the regulator, egg chamber, with extra tray for turning eggs, nursery tray, and thermometer. Good material, good workmanship and efficient arrangement of parts are all desirable features. Two dead-air spaces, good strong legs, plenty of space in the egg chamber, good windows properly placed, a good thermometer located where it can be read, without disturbing the machine—these are all necessary and among the strong points of a good incubator. This machine operates upon living products and it must bring forth living creatures, else it is useless.

Novices may be cautioned against buying an incubator of large size for experimental or farm work. The so-called 100 egg size is large enough for the beginner. One tray and one egg chamber are enough.

The Lamp and Burner

All poultry raisers should beware of buying a poor lamp. Manufacturers, as well as purchasers, should remember that while the lamp is half the incubator the burner is half the lamp.

Many kinds of lamps have been tried and many patents have been granted upon lamps and parts thereof for incubator use, but the tendency is to discard all that are in any manner complicated and to return to the plain, old-fashioned burner and chimney. The oil reservoir should be made of

metal, either copper or galvanized iron, as those made of glass are too liable to break and are too easy to handle conveniently. A reservoir should have a flat bottom and a flat top. It must have a cap to exclude the air, and it must be made of a material that will not warp or distort. It is very important for some reason that the operator is instructed for some reason and that it is not his machine at the moment but in such a case the lamp must be strong enough for a few hours' use. This reservoir should be plain and smooth on the outside. It should be well made and well finished.

The burner is the most important part of an incubator lamp. It should be made with the greatest regard to stability and accuracy. The flat valve is the most common. The burner should be made of good material, such as brass or copper, and never of poor material, such as iron or steel. If the wheel or lever turns hard, or does not turn to the thirty-second of an inch, it is useless and will cause trouble.

The Regulator

Many methods have been tried for automatically regulating the temperature of the egg chamber. For all of them depend upon the principle of contraction and expansion. The demand is for some simple device that will allow the temperature to

rise so high as to be higher, and that will maintain the temperature at that degree regardless of the weather or external influences. Most regulators act upon a damper over the top of the lamp, and, by opening or closing the same, regulate the amount of heat that passes into the incubator.

Incubators a Necessity

The modern improvement in incubators has made the rearing of fowls easily for egg production quite out of the question unless these machines are used. No experienced poultry man at the present time will undertake to rear fowls in large numbers

for the production of eggs and depend on the hens that lay the eggs for incubation. The so-called Mediterranean fowls cannot be depended upon for natural incubation. Artificial incubation must be resorted to if the fowls are to be reared in considerable numbers.

Choice of a Machine

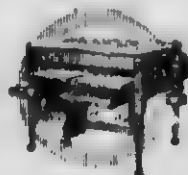
There are many kinds of excellent incubators on the market. As with many kinds of farm machinery, it is impossible to say that one particular kind is better than all others. Then, too, an incubator that would give very satisfactory results with one individual might prove to be quite inferior in the hands of another person. What is best for one is not necessarily best for another.

It is advisable, before investing extensively in any make of incubator, thoroughly to understand the machine. If good results are obtained, then additional machines of the same kind may be purchased. Failures are recorded simply because the individual fails thoroughly to understand the machine he is trying to operate, or, in other words, fails to learn how to operate that particular machine to the best advantage.

A successful poultry man must necessarily pay close attention to petty details. Not only is this necessary in caring for little chickens and mature fowls, but also in the care and management of incubators and brooders. The whole business is one of details.



Hatching Chickens by Incubator.



Incubator.



Chicken.



Fowls.

Points of a Good Machine

While incubators may vary considerably one from another, yet there are certain points to which all should conform. Some of these points are summed up in the following:

1. They should be well made of well-seasoned lumber. The effort of manufacturers to meet a popular demand for cheap machines has heretofore placed on the market incubators that are not only cheaply made, but made of cheap and not thoroughly seasoned material.

2. The incubator should be easy of operation. All its adjustments should be easily made and so arranged that the more delicate machinery is in plain view of the operator.

3. The machine should be automatic in operation. When supplied with the necessary heat, it should control perfectly within certain limits the temperature of the egg chamber.

This result is accomplished in various ways. The regulating force, whatever it may be, should be placed within the egg chamber, so that the regulator may vary as the temperature in the egg chamber varies, irrespective of the changes of temperature of the room in which the incubator is placed.

4. The regulator must be sensitive. The change of temperature which is necessary for the complete working of the regulator ought not to be more than 1 degree; that is, 1 degree above or below the desired temperature. It is better if the range of temperature can be reduced to one-half of 1 degree, thus making a total variation of 1 degree instead of 2 degrees.

5. In addition to the foregoing requisites, a convenient appliance for turning the eggs, positive in its action, should accompany each incubator. This may be an extra tray that is to be placed bottom side up over the tray of eggs and held firmly in this position while both trays are turned, thus completely transferring the eggs from one tray to another without jar. The different machines have very different appliances for accomplishing this result.

Excellent results are obtained by the use of many machines now on the market when the operator of these various machines is thoroughly interested. Poultry men have, for a number of years, hatched in incubators over 80 per cent. of all eggs put in the machine. It must not be inferred, however, that this is an easy thing to do. A record of this kind is attained only by close observation and good judgment, not only in running the machine, but also in the breeding and care of the fowls to produce fertile eggs.

Artificial Brooding

If the poultry raiser resorts to artificial incubation, it will be necessary to provide an artificial brooder of some kind. This may be simple and quite inexpensive, or complex and costly.

It is not necessary to expend very much money in the construction of an efficient brooder. It is necessary, however, to see that the brooder is capable of doing certain things. Some of these requisites are as follows:

What the Brooder Must Be

1. The brooder must be warm. The little chickens require a temperature of 90 degrees to 100 degrees the first few days, and at all times they should find it so warm in the brooder that they are not inclined to huddle together to keep warm.

2. If the brooder is automatic, then the temperature may be kept quite even throughout the whole floor space. If, on the other hand, the brooder is heated from one side or from the top and is not automatic, it will be best to construct it so that certain parts of the machine will be very warm; in fact, a little warmer than is necessary for the chickens, and some other part somewhat too cool. It does not take them long to

learn just where the most comfortable position is.

3. The chicks may be trusted to select the proper temperature if the brooder is of sufficient size so that it is never crowded.

A brooder constructed on this plan will require less attention than almost any other. It may undergo a considerable variation in temperature without overheating or chilling the chickens.

4. The brooder should be easily cleaned and so constructed that all of the floor space can readily be seen. Inconvenient corners are objectionable in brooders; in fact, any corner is objectionable, but if brooders are to be constructed cheaply it is almost necessary to make corners. If constructed of wood, circular ones are somewhat more expensive than square or rectangular ones.

5. The floor must not only be kept clean, but dry. Top or side heat is to be preferred to bottom heat, but there must be sufficient bottom heat to keep the floor dry.

6. As the chickens get a few days old, plenty of exercise must be provided. One objection to many brooders offered for sale has been that the chickens are kept too closely confined and not allowed sufficient exercise. It is a matter of surprise to many to learn how much exercise the smallest chicks require. With the young chicken, as with the athlete, strength is acquired by exercise, and above all other conditions of growth strength is the one thing necessary to the young chicken.

At the very first appearance of crowding in a brooder, as the chicks increase in size, the flock should be divided and some of the little fellows put into another brooder. Overcrowding is most dangerous to the brood, and the novice will do well to guard against it with the greatest care, remembering that it is easier to hatch the chicks than to rear them.

The brooder should be cleaned, set up and heated a few hours before the chicks are released from the incubator nursery. The brooder should be regulated as to heat so that it will show a temperature of about 95 degrees when the chicks are put in. Then it should be gradually lowered at the rate of 1 degree a week, according to the weather and the experience and judgment of the poultry man.

Feeding the Chicks

The chicks should not be fed until they are thoroughly dried and have been out of the incubator at least twenty-four hours. The first feed should be fine sharp grit or sand, upon which is sprinkled a very little hard-boiled egg chopped fine. After this they should be fed every three hours a little broken grain or, better yet, some of the excellent prepared dry chick food upon the market. Clean, fresh water should be supplied from the start. Wet, sloppy food should be avoided. If none of the manufactured chick foods are at hand, a substitute can be made by cracking a mixture of wheat, corn, and egg shells. Any good poultry journal will give valuable hints upon the subject of raising chickens in brooders.

Disease and Lice in Fowls

Disease and lice are the great obstacles to be overcome in poultry raising. The houses may be kept free from lice by a liberal use of kerosene emulsion and by whitewashing. Whitewash serves a double purpose, that of ridding the house of lice and making the interior much lighter. A small window, with the interior of the house whitewashed, will make the building as light as a much larger window without the whitewash. If the poultry houses are kept free from lice, the fowls can usually be depended upon to keep themselves free by a liberal use of the dust. If, however, body lice are found, they may be successfully treated by dusting insect powder under the feathers in the evening and allowing the fowls to remain undisturbed on the perches after the treatment.

Technical Terms Relating to Domestic Fowls

LEARN THE
POINTS.



(A)—Comb; (B)—Face; (C)—Wattles; (D)—Ear Lobes; (E)—Hackles; (F)—Breast; (G)—Back; (H)—Saddle; (I)—Saddle Feathers; (J)—Sickle; (K)—Tail Coverts; (L)—Main Tail Feathers; (M)—Wing Bow; (N)—Wing Bar; (O)—Wing Bay; (P)—Wing Butte; (Q)—Breast Bone; (R)—Thighs; (S)—Hocks; (T)—Shank; (U)—Spur; (V)—Toe.

GLOSSARY OF TECHNICAL TERMS

Barred, Barring.—Alternate stripes of light and dark across a feather.

Beard.—A bunch of feathers under the throat of some breeds, as Houdans or Polish.

Breast.—In a live fowl, the front of the body above the point of the breastbone, up to the throat. In a table fowl (dead), the breast is below this, and would be called the under part of the body in the live bird.

Breed.—Any variety of fowl in all its distinct characteristics. The breed includes all the varieties of color which are found in it.

Brood.—The family of chickens under one hen or brooder.

Broody.—Desiring to sit or incubate.

Cap.—The feathers under the base of the back hackles between the shoulders.

Carriage.—The bearing, attitude, or "style" of a bird.

Caruncles.—Fleshy protuberances, as on the neck of a turkey-cock.

Cockerel.—A young cock under one year old.

Comb.—The red protuberance on the top of a fowl's head.

Condition.—The state of the fowl as regards health and beauty of plumage; the latter especially.

Crest.—A crown or tuft of feathers on the head. The same as Top-knot.

Crop.—The bag or receptacle in which food is stored before digestion. Can be easily felt in any fowl after feeding.

Cushion.—The mass of feathers over the tail-end of a hen's back, covering the tail; chiefly developed in Cochins.

Hubbing.—Cutting off the comb, wattles, etc., so as to leave the head smooth and clean.

Ear-lobe.—The folds of skin hanging below the ears. They

vary in color in different breeds, between red, white, blue, and cream, and also greatly in size.

Face.—The bare skin around the eye.

Furnished.—Assumed full characters. When a cock has obtained his full tail, etc., as if adult, he is said to be "furnished."

Gills.—The term is often applied to the wattles, and sometimes more indefinitely to the whole region of the throat.

Hackles.—The peculiar narrow feathers on the neck of fowls, also found in the saddle of the cock. In the latter case they are called "saddle" hackles or feathers; hackles alone always referring to the neck-feathers.

Hen-feathered, or Henny.—Resembling a hen in the absence of sickles or back-feathers, and in plumage generally.

Laced, Lacing.—A stripe of edging all round a feather, of some color different from its ground color, as in Redbrights and Wyandottes.

Leg-feathers.—The feathers projecting from the outer side of the shanks in some breeds, as Cochins.

Mossy.—Confused or indistinct in marking.

Pea-comb.—A triple comb, resembling three small combs in one, the middle being the highest.

Pencilling.—Small markings or stripes over a feather. These may run either straight across, as in Hamburgs, or in a crescentic form, as in Partridge Cochins.

Poult.—A young turkey.

Rose-comb.—A broad solid comb, the top of which is nearly level and covered with small points. It becomes broader as it recedes from the front, ending with a spike or "leader" at the back.

Saddle.—The posterior part of the back, reaching to the tail, in

a cock, answering to the cushion in a hen.

Shaft.—The stem or quill of a feather.

Sickle.—The top curved feathers of a cock's tail. Properly only applied to the top pair, but sometimes used for one or two pairs below which can hardly be called tail coverts.

Splashing.—The marking produced by each feather having one large spot or splash of some color different from the ground-color. When applied to a laced breed, as in Polish, the word is explained by the much broader sicks at the tip of each feather.

Spur.—The offensive weapon near the heel of a cock or hen.

Squirrel-tailed.—Tail projecting in front perpendicular line, over the back.

Stag.—Another term for a young cock, chiefly used by Game breeders.

Strain.—Another term for symmetry, but rather markedly in connection with height or reach.

Strain.—A race of fowls which, having been carefully bred by one breeder or his successors, for years, has acquired an individual character of its own which can be more or less relied upon.

Surface-color.—That portion of the feathers exposed to view.

Symmetry.—Perfection of proportion.

Tail-coverts.—The soft, glossy, curved feathers at the sides of the bottom of the tail usually the same color as the sickles.

Tail-feathers.—The straight and stiff feathers of the tail only. The top pair are sometimes slightly curved, but they are always nearly if not quite straight, and are contained inside the sickles and tail-coverts.

Thighs.—The joint above the shanks; the first joint clothed all over with feathers. The same as the drumstick in dressed fowls.

Top-knot.—Same as Crest.

Tri-colored.—A term often applied to cockerels which should be of one uniform color, when their hackles and saddles and tails are much darker, and the wing-bow darker still. Chiefly in buff varieties.

Tri.—A cock or cockerel, and two hens or pullets.

Under-color.—That portion of the feathers under the surface, only seen when the plumage is opened or separated. That of the buff of the feather. It often differs greatly from the surface-color, and is of great importance in breeding.

Variety.—Some definite division of a breed known by its color or marking. Thus the breed includes all the varieties.

Vulture-hock.—Stiff projecting quill-feathers at the hock-joint. The feathers must be both stiff and projecting to be thus truly called and condemned.

Wattles.—The red depending structures at each side of the base of the beak. Chiefly developed in the male sex.

Web.—This term is indefinite, expressing a flat and thin structure. The web of a feather is the flat or plume portion; the web of the foot, the flat skin between the toes; of the wing, the triangular skin seen when the member is extended.

Web-bar.—Any line of dark color across the middle of the wing, caused by the color or marking of the feathers known as the lower wing-coverts.

SEVENTY DIFFERENT BREEDS OF DOMESTIC FOWLS



Dark Brahma.

The Dark Brahma is like light Brahma in form, but opposite in color.



Black Spanish

The Black Spanish lays six months from time of hatching five or six eggs per week.



La Fleche.

The La Fleche, French fowl, black plumage, a good layer in winter.



The Light Brahma

The Light Brahma has white plumage on the surface with a bluish-gray beneath.

Andalusians

The Blue Andalusian is an English breed of fowls, dating back 50 years, when they had been bred quite extensively in Andalusia, Spain, from whence they derive the name. They belong to the non-setting class. As layers they have no superiors, laying the whole year round, both summer and winter. In color, the eggs are white and of medium size. They are very hardy, chicks growing very fast, pullets often laying at the age of four months; color is slaty blue, have red wattles, face and comb, and white earlobes; are fine in appearance, gay, stylish, commanding the admiration of all who see them. They are about the same size as the Minorca. However, they are not without a fault; they do not breed as true to color as most other varieties do, and throw off a larger per cent of off-colored chicks than any other variety. However, their other good qualities make up for this weak point.

Anconas

Mottled Anconas are considered by many to be the most beautiful of all the Mediterranean varieties. They are similar to the Leghorns in shape and size, have a yellow skin and the plumage is black, evenly mottled all over with white. They are wonderful layers of large white eggs and are fast coming into general favor, since they combine great beauty with the best practical qualities.

Bantams

The Buff Cochins, or Pekin Bantam.—In color they are a golden buff, same as the Buff Cochins, except the cock is usually dark, almost chestnut. They are very quiet, tame and docile, making the finest pets. In size they are but a little larger than the Golden Sebright Bantam, being a little broader and heavier set. All who see them admire them for their exquisite unique appearance and beauty. They are quite good layers of rather small eggs, light in color, are good setters and good mothers. Chicks are easily raised, are hardy both as fowls and chicks. They bear confinement well, thrive just as well in small enclosures as running at large, are fine pets to have on a nice green lawn, where they command the admiration of all who see them.

Golden Sebright Bantams are one of the most attractive breeds of all Bantams. No breed among the beautiful pigmies excel the Sebrights in beauty of pencilling and none are prettier pets. In color they are rich, golden yellow, laced with black markings, being very distinct and clear. They have proven very hardy both as chicks and fowls, breeding very true to color. They are both useful and a true fancy fowl, excellent layers of small eggs, good setters and mothers. They are quite small, standard weight of cock, 26 ounces; hens, 22 ounces. They are stylish, active, and no lover of the beautiful can afford to be without them, as they are the attraction and admiration of all who see them.

Brahmas

The Brahmas are the heaviest of our domestic fowls. Though classed as an Asiatic breed, and descended from Oriental parentage, this breed in its present form is really an American production. Standard weights: cock, 12 pounds; cockerel, 10 pounds; hen, 9½ pounds; pullet, 8 pounds. These weights are often exceeded. Though large, the birds are stately, with fine carriage. "The lordly Brahma" well expresses it.

Light Brahmas.—Almost without exception the Light Brahma is a favorite with poultrymen, even with those who do not breed them. They are often referred to as "the aristocrats of the poultry yard." In size they are the largest of our domestic fowls. This, combined with their proud and stately carriage, makes a flock of them attractive, no matter where they are seen. They have pea combs and heavily feathered legs and toes. The color is white with black tail, black and white hackles, wing flights and tail coverts. The hens lay brown eggs. Light Brahmas are not remarkably early in maturing; but they are very hardy, and in the markets of this country this variety is a great favorite as "soft roasters," and as mature fowls they very often are chosen for the family dinner in preference to the more costly but not more palatable turkey. Light Brahma hens have made high records as layers, under good care. Their eggs are very large, weighing from 28 to 32 ounces to the dozen, and are in great demand in some of our markets. The Light Brahma has a firm hold on the affections of our people, and the poultry breeder who has good ones need never lack for buyers, who will pay good prices.

The Dark Brahmas are one of the most prominent members of the great Asiatic family. They are very beautiful, especially the female. The plumage of the female is a steel gray, with delicate pencillings, except on hackles, where the pencillings are quite prominent, making them a very desirable fowl for the city and town, as the dust and soot will not soil their plumage. The plumage of the cock, although quite different from that of the hen, commands admiration of those who have a taste for the beautiful in nature. No breed is more hardy from the time it picks the shell until ripe in old age than the Dark Brahma. As egg producers they are second to none of the Asiatics. With their great vigor of constitution when young, they feather rapidly and are ready early for the market as spring chickens and broilers. In weight they are about the same as the Light Brahmas, cocks weighing at maturity, when in good condition, from 10 to 12 pounds, and hens, when in good condition, 8 to 10 pounds.

Seventy Different Breeds of Domestic Fowls

Buckeyes

The Buckeye.—Originated by a woman in Ohio, from which state it takes its name. Mrs. Frank Metcalf produced this breed from a cross of Asiatic Cornish Indian, and some of the game fowls. Primarily the Buckeyes were bred for egg production and market poultry, but perfect specimens are beautiful birds.

Buttercups

This new variety has come to the front rapidly in the last three years. They were originally brought over from Sicily and have won a name for their persistent laying. They are just a little larger than Leghorns and are very gentle and tame. They stand confinement well, and the hens are regular egg machines. Their comb is different from any other variety, being cup shaped, and their plumage is very striking. The males are a rich brilliant red top color and the hens are beautifully marked throughout.

Campines

Silver Campines have spread over the country like wildfire and are sure to remain one of the most popular of the smaller varieties. They compare in size with the Leghorns and their supporters claim they will outlay the Leghorns every time. Their color is very striking, being a black and white, very narrowly barred or penciled and they are very active and great foragers.

Cochins

The Buff Cochins of today is the most popular of the Cochins family. It is descended from the Shanghai fowl of sixty years ago, which started the greatest "boom" for improved poultry this country has ever experienced. From the ungainly, loose-jointed, awkward Shanghai fowls of sixty years ago, American breeders have produced the compact, full-feathered, thick-meated Buff Cochins of today, which is distinctively the most perfect representative member of the Asiatic class. Cochins are very hardy, enduring severe weather easily. The hens are fairly good layers, the best of mothers, and very domestic. As a market fowl, the Buff Cochins is very profitable, putting on weight with a smaller quantity of feed than almost any other variety. The poultry breeder who has a flock of good Buff Cochins has something of which he may well be proud.

Partridge Cochins are very gentle and stand confinement better than other varieties. They are very large and fine winter layers, and their color is as handsome as any variety when stock has been carefully selected from the famous strains.

Crevecœurs

This is a breed but little known. Black in plumage with a crest on the head so full as to almost obscure the eyes.

Dominiques

The Dominiques resemble the Plymouth Rocks. They bear confinement well and do not appear to deteriorate from inbreeding to the extent observed in some of the other breeds. They mature early, are hardy, make good mothers, and are valuable as a farm variety. Weight: Cock, 8½ pounds, hen, 6½ pounds.

Dorkings

Colored Dorking.—Same shape and general type of body, but much darker in color, and a little heavier in weight than the Silver-Grays. Standard weights: Cock, 9 pounds; cockerel, 8 pounds; hen, 7 pounds; pullet, 6 pounds.

Silver Gray Dorking.—The Dorking is probably the oldest breed of domestic fowls. It belongs to the English class, and in England has been brought to a high state of perfection.

Ducks

Where large numbers of ducks are kept for supplying eggs for incubators the Pekin variety is usually preferred and can be kept without ponds if an abundance of drinking water is provided. When laying they should be fed twice a day as much as they will eat.

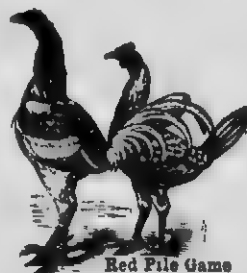
Faverolle

A general purpose breed of increasing popularity. Densely whiskered; five toes. The varieties: English and French Salmon, English Ermine, French Black and Blue.



Cochin Bantam

The Cochin Bantam, from Pekin, China.



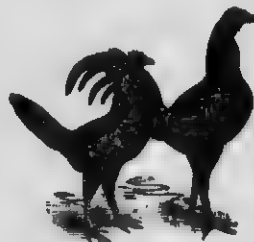
Red Pile Game

The Red Pile Game lays on the average, 170 eggs a year



White Leghorn

The White Leghorn lays four and five months after hatching 300 eggs a year.



The Game Bantam.

The Game Bantam, a profitable variety for raising on farms.

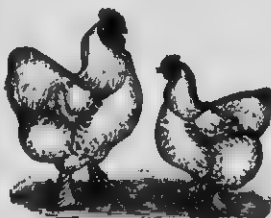
Seventy Different Breeds of Domestic Fowls



The Dorking, admired for beauty, and as a table bird.

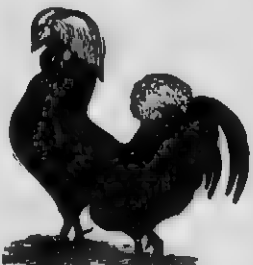


The Sebright Bantam has proudest carriage to be imagined in a bird so small.



White Cochins Fowl.

The White Cochins, a large fowl, esteemed for prolific production of eggs.



The White Crested Poland has rich, black plumage with pure white crest.

Frizzles

The Frizzle fowl is valued largely because of its oddity in feathers, which have a tendency to turn backwards and upwards.

Games

The Black Sumatra Game is not as well known in the poultry circle as many other varieties of the Game. They do not resemble the Game family to a very great extent, being more heavily feathered than most Games. In color they are a solid black throughout, shading being a lustrous green, which makes them very rich and handsome in color. They are very good layers of medium sized eggs, ranging in color from white to a darker shade. They make exceptionally good mothers, and will take care of a brood of chicks as well as one might wish. Chicks are hardy and grow fast. They are a splendid table fowl, as all Games are. Cocks weigh, when in good flesh, from 6 to 8 pounds, and hens from 5 to 7 pounds.

Brown Red Games are second to none in this country, fine specimens with great vitality and hardness of constitution. To say they are good layers will not do them justice, as they have proven themselves in laying almost equal to any fowl, and are surpassed by few. They are very handsome, the color of male, neck, back and saddle lemon, with narrow stripe of black in the middle of the feathers; breast, ground color black, laced some with lemon; wing bow lemon; wing coverts glossy black, primaries and secondaries black, and tail glossy black. The female, neck lemon with a narrow stripe of black in middle feathers; breast, ground color black, evenly-laced with lemon, otherwise the plumage is black throughout. They bear confinement remarkably well, are hardy both as chicks and fowls. Chicks grow very fast, and mature quite early. The hens make splendid mothers, taking the best of care of their young. Cocks weigh from 6 to 8 pounds; hens from 5 to 7 pounds. They are a fine table fowl, and dress very nice and presentable.

Cornish Indian Games have gained public favor very rapidly. It is a breed for general utility, having the laying qualities of a market fowl, i. e., compactness, yellow legs, heavy weight, the flesh put on at the right place, from which there is but little waste in dressing, and being of quick-growing habits they produce a fine broiler in a short time because they have short feathers, the nutriment required to put feathers on other breeds going to flesh, which is more juicy and tender in this breed than in a young turkey. The Indian Game hens are good setters and mothers, and the chicks are very hardy. In color the fowls are quite pretty; the bright brown shafts and the glossy green facing making a beautiful contrast. Here we have a fowl for the market poultryman, the farmer, the broiler-raiser, the egg producer and the fancier. The general appearance is that of a powerful bird. Body very broad, thick and compact; flesh firm and solid. In the male the plumage of the breast and underbody is a green glossy black, neck-hackle same color, with brown crimson shafts to feathers; back and saddle a mixture of green glossy black and brown crimson. Wings chestnut brown, with metallic green glossy black wing bar. In the hen the ground color is chestnut brown, with beautiful facings of metallic green glossy black. The skin in both sexes is a very rich, bright, deep orange yellow, and their legs are yellow or a dusky yellow, which makes them very desirable for market. Face, wattles and comb are a rich red.

The Pit Games are in various colors, such as Black Red, Brown Red, Blue Red, White, and Black, and the stock should be thoroughly tested and proven absolutely dead game. Birds should be sure cutters, aggressive, and warranted never to quit.

The Red Pyle Game is in general make-up and quality the same as the Brown Red or B. B. R. Game, only differing in color. They are very courageous and hardy, and to most people not lacking in beauty. Color of cock, hackle and saddle, orange, light red or chestnut; breast, shaft and margin of feathers chestnut red, wings white and red, tail white, body white. The hens are mostly white to a creamy white, running darker on breast and wings.

Geese

Geese require almost no care, but should have dry quarters. They prefer grass on the pasture and on this they will thrive. In winter one good meal a day, as much as they will eat, of cooked potatoes or turnips with cut clover, ground oats, and ground meat added will be sufficient. The same food is excellent for goslings, which should be fed three times a day.

Guineas

The Guinea Fowls are usually recorded with the chickens. They are good layers, poor mothers, being prone to wander and steal their nest. This fowl should not be kept in towns, as their discordant voice in the early morning makes them unpleasant for neighbors.

Seventy Different Breeds of Domestic Fowls

Hamburgs

The Hamburgs are small, active, and great fliers; for this latter reason extra precaution must be taken and they really require a wide range to do well. They are among the most persistent layers and when properly kept even equal the Leghorns. The chicks are rather delicate and the adults demand more attention than any of the other egg-producing breeds to be equally profitable.

The Silver Spangled Hamburgs are one of the most beautiful varieties that can be found on the poultry list. No one can pass a flock of them without a glance of admiration. For beauty they are unsurpassed and too much could not be said of this beautiful breed. As egg producers they stand in the front rank, laying the year around. In color eggs are white, and medium in size. Chicks grow quite fast and mature very early. Pullets often begin laying at four months old. They are very small feeders, and bear confinement in small enclosures remarkably well. For laying qualities and beauty, they stand on their own merits and cannot be over-estimated. Hens will weigh from 3 to 4½ pounds, cocks from 4 to 5½ pounds.

Houdans

Houdans are a French fowl. It is not known just how long they have been in existence, nor is it known who the originator was. However, they are a very old breed and are deserving of considerable credit. The Houdan hen is a good layer, her eggs are of good size and in color are white. She belongs to the non-setting varieties. After they become several years old some of them will get a little broody but are easily broken. The Houdans have five toes, a crest and beard, are shaped much like a Dorking, hence are considered valuable as a fine table fowl, meat tender, juicy and fine flavored. Color of legs of the young is pink; of the old a light gray with sometimes pink on the side. The chicks are decidedly handsome and grow very fast, weighing 4 or 5 pounds at the age of 4 months, but, of course, the growth depends largely on the food and care they receive. They are remarkably hardy and thrive well under ordinary care. Standard weight for cocks is 7 pounds, hens 6 pounds. They are not a high flyer, will not roam far away, are very tame and docile; one can make fine pets of them and they are well adapted for small runs.

Javas

The Javas (Black, Mottled, and White) are an old American class of fowls that for no good reason have lost popularity. They are excellent as egg producers and for market purposes, maturing early and having the yellow shanks and toes, the absence of which constitutes an objection to some of the dark-colored breeds. The hens make good setters and mothers, and the Javas bear confinement well. The Black variety is most commonly kept. Weight: Cock, 9½ pounds; hen, 7½ pounds.

The Black Java is an old variety fowl. It is claimed that the Black Javas were bred from the Plymouth Rock. Now, if the Black Java have their origin from the Plymouth Rock, they must of necessity occupy a front rank as an American breed. They will withstand the severest weather in our northern climates. Also are prolific, and thrive just as well in our warmer southern climes. Chicks thrive well from the time they come out of the shell till old age, maturing very early. They are not as apt to take disease as some other varieties, being as near proof against disease as any fowl. They are about the best layers for a large fowl, laying a dark-colored egg, but not strictly one color; some are a little lighter in color than others. The Java hens make excellent mothers, taking the best care of their young. They are good setters, but are not as persistently broody as some of the large varieties of fowls. In color the Black Java is what the name implies, black throughout. The cocks are of a lustrous greenish black, about the same as the Langshans (see). They possess rare market qualities, having the best possible make-up for a valuable market fowl.

Lakenvelder

The Lakenvelder resembles the Leghorn in form, size, activity and egg laying quality. Color white with black head, hackles, rump, and tail.

Langshans

Black Langshan.—Asiatic, but lighter weight, rangier and longer legged than the other members of that class. Standard weights: Cock, 9½ pounds; cockerel, 8 pounds; hen, 7½ pounds; pullet, 6½ pounds. Skin white with pinkish-white flesh. The tail feathers of the male attain great length. Legs and outer toes feathered. Comb single. Color black and glossy with a greenish sheen on back. The White variety has the same weight and general characteristics as the Black, but the plumage is pure white.

Buff Langshan.—A very fine breed; have been largely imported from England formerly. We have found them among the best breeds for laying and general purposes. The demand for them in this country has been all that could be desired.

The White Langshans have given most excellent satisfaction, and are more popular than the Black Langshans. Some who are raising them say that they lay the year around and are a most excellent table fowl.



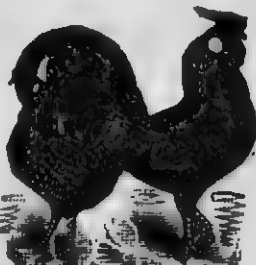
The Silky Fowl, so named because its plumage has a silky, hair like appearance.



The American Dominique. A valuable and popular fowl.



The Duck-Wing Game has silver gray plumage, head and face bright red.



The Gold-Spangled Hamburg, one of six varieties of bantam fowl.

Seventy Different Breeds of Domestic Fowls



Langshan Fowl.

The Langshan, large, showy, black plumage, a good layer in winter.



Wyandotte

The Wyandotte, has beautiful plumage and is a good layer of large eggs.



Japanese Bantam

The Japanese Bantam, Bantam, a town on the Island of Java.



Partridge Cochise

The Partridge Cochise, a large and esteemed breed of domestic fowls.

La Fleche

This is a French fowl, both male and female having a rich black glossy plumage. Has a large compact crest which nearly obscures the face.

Leghorns

The Rose Comb Brown Leghorns are very popular, being better adapted to our colder climates than the Single Comb varieties. They combine both usefulness and beauty. As egg producers they are simply the same as all other varieties of Leghorns, being first-class in that respect. We have often noticed the statement made about some breeder's favorite variety, as everlasting layers, egg machines, etc. If there are any fowls to which we can justly apply this term, it is to the Leghorn family. They have good style, beautiful plumage, and are, generally speaking, very handsome and attractive. They are hardy, chicks easily raised, and mature quite early. Pullets begin laying quite young if well cared for. In size they rank the same as the Single Comb variety. Cocks weigh about $4\frac{1}{2}$ to 6 pounds, hens $3\frac{1}{2}$ to 5 pounds.

Rose Comb White Leghorns.—This is one of the popular breeds of the heavy laying varieties, and are identical with the Single Comb White Leghorns, except that the comb resembles the combs of the Hamburg, and are sometimes called pea-comb Leghorns. They are much admired by poultry fanciers and those having egg farms, being wonderful egg producers. Their freedom from frozen combs makes them more desirable for our northern climate than the single comb varieties. They are very stylish and make a very attractive appearance. They belong to the non-setting class of fowls, and are unexcelled as layers by any of the Leghorn or other families. The eggs are very white in color and medium size. They are very hardy both as chicks and fowls. Chicks grow very fast. Pullets frequently begin laying at four months old. They are a very fine fowl for the table as far as they go, but being rather small, we could not recommend them as a valuable market fowl, but so far as turning cents into dollars in the production of eggs, they stand in the front rank.

Single Comb Brown Leghorn.—There has been much dispute as to the early history of this variety. Certain it is that the early importations were far different from the graceful active brown beauties of today. In all but color this variety should be the same as the White Leghorn. Body and breast color of male is bl. k. Body color of female light brown, the surface on back finely stippled with a darker brown. The breast is a rich salmon, shading off lighter under the body. Legs clean and yellow; skin yellow. The hens lay white eggs, and are non-setters.

Single Comb Buff Leghorn.—This breed has the same general breed characteristics as the other members of the Leghorn family. The color is an even shade of rich golden buff, free from shafting or mealy appearance. Under color a lighter shade. A mingling of different shades of buff in different sections is a serious defect.

Single Comb White Leghorn.—Originated in Italy, but bred in this country for many years. As usually bred, small in size, having no standard weights. This breed is alert, active, of graceful outlines and very attractive appearance. Large, single comb, that of the female drooping to one side. Plumage pure white. Legs clean, yellow. The hens are prolific layers of white eggs. This breed is the standby of most of the large egg farms where white eggs are desired.

Malays

This is a little known breed of which the American Standard of Perfection says, "the cock has a height of 28 inches and a wing 18 inches," the plumage of the male being red or maroon and the female dark brown.

Minorcas

The Black Minorca is a well established breed of English fowls, belonging to the Spanish variety, and wherever bred are considered a valuable breed; are hardy both as fowls and chicks, easily raised, mature early, and pullets commence laying when very young. They are non-setters, small eaters, splendid foragers, and, without doubt, very profitable. Their adaptability to all sorts of places, whether in confinement or allowed unlimited range, makes them very popular, and suitable to the city fancier as well as the farmer. Their plumage is a pure black with green or metallic lustre. Their legs are nice and smooth and medium in length. The chief and striking ornament of the cock is his comb, which is very large, single, straight as an arrow and evenly serrated; has a large, flowing tail, carried somewhat high. The comb of the hen lies over on one side of the face, in a peculiar double fold, similar to those of the Leghorn, but much larger. Wattles are in proportion to the combs. The face is red, but the lobes are of pure white, and show up very distinctly. They are very stylish, having a stately, upright carriage, close, compact body, medium low, and are of a stouter and squarer build than the Spanish. Standard weight of cocks 8 pounds, hens $6\frac{1}{2}$ pounds.

The White Minorcas originated in Spain and are a very old variety. How they originated is not known; but the supposition is that they are sports from the Black Minorcas, so it is a well known fact that a black fowl will occasionally throw off a white chick.

Seventy Different Breeds of Domestic Fowls

Minorcas—(Continued)

The White Minorcas are similar to the Black in every way with the exception of color, and as many prefer the white chicken they are very popular.

They lay a very large chalk-white egg and are splendid layers; they are larger than the Leghorn family and are a better table fowl, in fact, they rank very high as a table fowl; while great in egg-production, the hens laying from 200 to 250 eggs in a year.

As to vitality and productiveness and quality they equal their cousins, the Black Minorcas.

They are the same build, have coral red faces, white ear lobes and of same size, they are non-setters, great foragers and rustlers.

They have splendid plumage, very gay and attractive in appearance, having the true Minorca shape and good qualities in general.

Orpingtons

The other varieties of Orpingtons were introduced into this country ahead of the Blacks and were so popular from the start that we paid very little attention to the black birds, but the English breeders who originated all the Orpingtons kept insisting that the Blacks had all the good qualities of the others, so American breeders finally took them up. They immediately proved their worth and today the Black Orpington is gaining in popularity faster than any other variety. They have many advantages over the other varieties, and their immense size and wonderful laying qualities make them very profitable. They are very hardy and make the quickest growth of any variety known.

The Single Comb Buff Orpingtons are becoming a very popular breed. They have been a leading breed in England for a number of years; in fact, they are as popular there as the Barred Plymouth Rocks are in America. As a general purpose fowl they are very good. They have a rich buff plumage, and breed as true as any of the buff varieties. They are also good layers. They have nice, well-rounded bodies and white skin, and have all the good market qualities as well as the laying qualities. They are very quiet and tame, and make good mothers.

Diamond Jubilee Orpingtons have been but little bred in this country. The breed was produced by crossing Hamburgs, Cochins and Speckled Dorkings. They are both single and rose comb varieties. The hens are very prolific.

The White Orpingtons are of the same general description as the Buffs, except that they are a pure crystal white and they have all the good points of the Buffs. This variety has been widely advertised during the past few years and a tremendous demand has sprung up for them. They can be developed into excellent winter-layers.

Peacocks

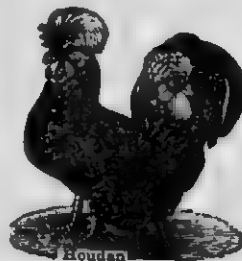
The Peacock is classed among domestic fowls, and is an exceedingly beautiful bird. Native of India. They lay from 25 to 30 eggs and hatch out but one brood a year. Accustomed to roosting very high in a wild state, they desire a high perch where they are kept.

Plymouth Rocks

Barred Plymouth Rocks.—This breed is as solid as its name. They stand unequalled as general purpose fowls. They are quick to mature and make plump, juicy broilers at eight to ten weeks of age. The pullets begin laying early and are persistent layers the whole year around. American in origin and name. Of fine carriage, medium in size. Standard weights: Cock, 4½ pounds; cockerel, 3 pounds; hen, 3½ pounds; pullet, 3 pounds. Hardy. Built for business, both egg and meat production. Single comb. Smooth legs and yellow skin. Lays brown eggs. Plumage hard to describe; grayish white, each feather crossed by narrow bars of darker color extending to the skin. Difficult to breed to standard, but the ideal fanciers' fowl.

Buff Plymouth Rock.—Requirements for this variety same, except plumage, as for other Plymouth Rocks. The variety is said to have been originated in New York State, and to have been exhibited first less than a score of years ago. The color desired is a rich golden buff, the same shade throughout the specimen being desirable. These are excellent utility fowls, as well as desirable for the fancier.

Columbian Plymouth Rock.—This is probably the newest member of the Plymouth Rock family. It was "originated" by several different individuals at about the same time. Some claim its origin as from "sports" of the Columbian Wyandotte, others as from crosses of other Rock varieties with some Light Brahma blood added. In all but plumage it must conform to Rock requirements. The plumage is the same as that of the well-known Light Brahma. Well bred, it is a handsome fowl, in black and white, and its promoters claim that it stands high in utilitarian qualities.



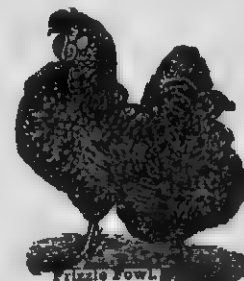
The Houdan has black and white feather crest. A prolific layer.



The Brown Leghorn has yellow legs, lays early, 200 eggs a year.



The Spangled Poland, like silver spangled, ranks high among ornamental fowls.



The Frizzle Fowl is peculiar, every feather curled and turned back from the body.

Seventy Different Breeds of Domestic Fowls

Flavor of Eggs

The flavor of eggs may be affected in two ways, first by the absorption of odors after the eggs have been laid. Eggs should be clean and kept in a clean place where disagreeable odors can not penetrate. Secondly, the flavor of eggs may be affected by the character of the food fed to the laying hens.

Too much ground fish, while being a food which helps to promote laying, will give the eggs an unbearable flavor. Strongly flavored vegetables, such as turnips or onions, if fed freely, will have a like, though perhaps not so marked, effect. Care, therefore, should be taken with eggs intended for consumption to keep them away from bad odors, and discrimination should be exercised in the food given to the hens.

If the eggs are to be hatched, however, the feeding of fish scrap, onions and turnips, and the like, will have no deleterious effect upon the hatching.

Frost Bite

If the comb or wattles of fowls become frozen, and it is discovered before they thaw out, apply snow or cold water to remove the frost, for this gradual thawing will often save them. Then apply vaseline to the affected parts twice a day.

Gapes

Gapes is caused by the presence of small worms, which are attached to the lining of the trachea or windpipe, where they cause much irritation and often death to young chickens.

Gapes usually occur when the chicks are from 2 to 6 weeks old. Separate the well from the sick birds and clean the coops, pens, and feed and water dishes by disinfecting with a 5 per cent solution of carbolic acid. Sometimes the worms can be removed from the trachea by inserting a feather moistened with turpentine or kerosene. The oil will cause the dislodging of the worms, and some will be drawn out with the feather while others will be expelled by coughing or sneezing. Place the chicks on a piece of paper, so that the worms may be caught and burned.

Lime

Ordinarily, the hen does not consume enough lime to form the shells of eggs if she is laying abundantly unless something besides the ordinary grain feeds is accessible to her. Oyster shells are very good for this purpose. A box of crushed shells may be placed before the fowls, allowing them to eat at will.

Plymouth Rocks—(Continued)

Partridge Plymouth Rocks.—This new variety of the Plymouth Rock family has sprung into universal favor because of their beauty and utility qualities. They are very rich and beautiful in color, the male being a rich brilliant red, marked with black, and the female a rich mahogany, beautifully penciled with a darker color. They stand confinement well and are great layers.

Silver Pencilled Plymouth Rock.—This is one of the newest varieties of Rocks. There are conflicting claims as to its origin. In shape, size, and other Plymouth Rock characteristics they must conform to the breed requirements. The general color scheme of the plumage is silvery white and black. The beautifully pencilled feathers render this a most attractive variety and as it is claimed to possess the practical qualities of the family it should be a good utility fowl as well.

The Pea Comb White Plymouth Rock is what we might call a general utility breed. Like the Single Comb variety, they possess all the desirable qualities of an all purpose breed, and in one point they will surpass them. Having the Pea Comb, they are what may be called frost-proof, which is a very desirable feature in cold climates. They are not bred as extensively as the Single Comb variety, owing to the fact that they are practically a new breed, and people have not become acquainted with their qualities as they should. They are simply a grand breed of chickens and are deserving of a foremost position among breeders. They are large, good style, grand, stately carriage, well shaped bodies, have a nice yellow skin, which is so desirable in market poultry. Hens make good setters (but are not persistently broody), good mothers, will care for their young as well as any breed. Their chicks grow very rapidly, feather out early and will round up for market when quite young. Their laying qualities are not to be disputed. They will lay as many eggs as any of the large breeds. Their eggs are the same in color as other Plymouth Rock eggs. This is a noble breed and is destined to become one of the leading varieties when once their merits are better known.

White Plymouth Rock.—In size, carriage, color of legs, skin, face, etc., same as the Barred, but plumage pure white. Some judges say they have more typical shape than the original Barred variety. As table fowls, they lead the other varieties in many localities. Whites are easier to breed to standard than other varieties of Rocks, hence better for the beginner.

Polish

White Crested Black Polish.—This is the most beautiful and ornamental of all the Polish family. Their large white crests and shining black plumage make a very pretty contrast, and they are great layers. The eggs are fine flavored. A small pen of these birds make a very beautiful sight on the green lawn, and they will keep the table supplied with fresh eggs the year around.

Redcaps

The Redcaps are an old, useful variety of good size and development. Weights, 7½, 6, 6, and 5 pounds; very large rose comb; color, in male red and black, in female, brown and black.

Rhode Island Reds

Down in the southern part of the little State of Rhode Island is a district known as Little Compton. It lies on the shore of the Atlantic Ocean, exposed to the raw winds of winter and the scorching suns of summer. The land is poor and rocky, and the soil returns but little when an attempt is made to produce farm crops. The people residing in this district are of a hardy race and thrifty, yet the natural disadvantages of their surroundings would seem to be insurmountable. The men are mostly engaged in fishing along the coast and the women raise poultry for the near-by cities. In such a district, only a very strong, thrifty breed of fowls survives, and it is here that we find the

First Record of Rhode Island Reds

The residents of this little district produced a hardy breed of fowls that were great foragers, quick to mature, and wonderful layers, and yet they started out with no definite idea of the breed they were producing. In fact, the Rhode Island Reds were produced and bred for years before they were known outside of this little district, and it is only in recent years that their fame has spread over the country. At first people were inclined to scoff at them because of their peculiar color, but now their admirers are legion and they have a foremost place with poultrymen, both as a fancier's fowl and for market. A great many claim the Reds originated from importations from Java brought in by the whaling vessels. These fowls have spread over the country like wildfire, and now the demand for first-class stock and eggs is something enormous. Only one variety leads them in total sales, and that by a small margin.

Seventy Different Breeds of Domestic Fowls

Hens' Nests.

Every poultry house should be well supplied with nests which are easily accessible and readily removed for cleaning and disinfecting. There are many methods of arranging nests, each method having some particular advantage over all others.

Location of Nests.

The nests may in some instances be placed under the front edge of the dropping board and so arranged that the hens enter from the rear and the attendant gathers the eggs by opening a door or doors on the front side. This is an inexpensive arrangement, as the dropping board forms a cover for the nests. These nests are dark, which is a decided advantage, as hens like to hide, and there is less danger of them learning to eat eggs. It has the decided disadvantage of making the floor under the dropping boards of little use in feeding; it darkens the floor and hens are much more likely to lay in the straw on the floor than in the nests, with the result that many times eggs are left for several days before being gathered. The careful poultryman who furnishes guaranteed eggs will not sell those which have been laid on the floor. In buildings which have a high rear elevation, some trouble may be obviated by elevating the roosts and dropping board. This can be done, especially with Leghorns or other light breeds that fly well. For the heavier breeds, it will be found necessary to put in a slanting board with cleats to enable the hens to walk to such a height.

Floor Well Bedded.

It will always be found necessary to keep the floor extremely well bedded. Many heavy hens will jump down from the dropping board instead of walking down the inclined perch and if the litter is thin, they may injure their feet.

Another quite common arrangement is to fasten small open boxes to the walls of the poultry house. These boxes can be fastened with two 6d nails and easily removed for cleaning. Where this system is used, if the boxes should accidentally become badly infested with mites, the entire box being of little value, can be burned and new boxes put in. This method does not allow trap nesting, and the nests are not dark, yet it is used very extensively by poultrymen.

Gather Eggs Twice a Day.

Where hens are confined and allowed to lay in open nests of this type, the eggs should be gathered at least twice each day. This is an extremely good practice and should be followed, especially on farms where a good quality of table eggs is being produced.

Size of Nests.

A nest for a Leghorn or other small hen should be 12 inches square; for the larger varieties, 14 inches square. The nest should give at least 12 inches head room and be about 14 inches high. They should be kept clean and well bedded with fine nesting material, such as straw or hay. Shavings, excelsior, etc., are not satisfactory as a rule, for they may stain the eggs. Coarse straw and other harsh substances do not make satisfactory nesting material. A hen likes a pliable, soft substance in the nest.

First Record of Rhode Island Reds—(Continued)

This breed comes in two distinct varieties, each the counterpart of the other except in the shape of comb. The Rose Comb birds are well fitted to withstand the extreme cold of the northern winters and the Single Comb birds are adapted to the warmer climates and for those who do not fancy a rose comb. The Single Combs will do as well in cold weather as the others but must be kept warmer to prevent their combs from freezing. Many poultry raisers in northern Canada are getting the best results from their Single Comb birds.

The Rose Comb Reds are identical with the Single Combs except that they have a low, close-fitting rose comb not so liable to be frosted.

White Faced Black Spanish

Black Spanish Fowls belong to the Mediterranean class. They are a non-setting breed, and are as hardy as the Asiatics. The Spanish are much larger than Leghorns, being as heavy as Wyandottes. As layers they are not surpassed by the Leghorns. They lay a large, white egg and lots of them. Their plumage is a rich, glossy black throughout.

Sultans

"The Sultans have," says the Standard, "for their most attractive characteristics, the novel feature of a full crest, muff and beard. Plumage, male and female, pure white."

Turkeys

"Have for turkeys," says "Making the Farm Pay," "an open shed for roosting. Feed them in the same manner as suggested for hens in winter."

Wyandottes

The Black Wyandotte is one of the most valuable breeds, and all because of their good qualities as a general purpose fowl. Their plumage is a beautiful glossy black, which makes them very attractive.

The Buff Color.—Many prefer this color, and with it you get all the quality that is given for any of the other classes of Wyandottes.

In general utility, the size, shape, egg laying qualifications, etc., are practically the same in all the Wyandotte family, of which there are quite a number. You will notice that we list the Buff, Golden, White, Silver Laced, Partridge, and Columbian. Some prefer one, while others choose another. There are so many people who prefer the buff color to any other, and would like to have something in the Wyandotte class, and to lovers of such a fowl we highly recommend the Buff Wyandottes. It is a breed that will not by any means disappoint you. They are all that you can possibly expect of them. The Buff Wyandottes are good layers, and especially if you get a good laying strain introduced.

The Buff Wyandottes make good mothers and are good setters, but they are not persistently broody. The chicks are hardy and grow vigorous, maturing very early. Cock-birds will weigh from 7 pounds to 9 pounds, and hens from 6 pounds to 8 pounds. The standard requirements of the color of this breed calls for a rich golden buff.

The Columbian Wyandottes are a very popular fowl indeed. It is a fowl that is not known by every one, and a fowl that you do not find in every barn yard. It is considered one of the most beautiful fowls.

The Light Brahma is the older of the two fowls, and being very beautiful, it was the desire of breeders to get a bird with the same markings, with smooth shanks. The result was the Columbian Wyandotte. This bird is not as large as the Light Brahma, by any means, and does not have quite the same shape. It has smooth, yellow shanks. The Columbian Wyandottes are not unlike other Wyandottes as far as shape and other utility characteristics are concerned. The Wyandotte family, next to the Rock family, is one of the most widely known of any of the poultry breeds, and is looked upon as having peculiar characteristics of their own that really excel some of the other well-known breeds that are offered. The Columbian is by no means a sport of any of the other Wyandotte varieties, but it is a breed that has been built up by itself, and has been bred up from some of the most noted strains, and has proven to be one of the highest class of the Wyandotte breed.

The Golden Wyandottes were made by crossing the Silver Wyandotte with a breed known, locally, as Winnebagoes—a strong breed of a red color, now extinct. The Golden Wyandotte has a tendency to grow rather larger than the other varieties of this family, which is in its favor as a market fowl. It is often called the "beauty breed," on account of its pleasing combination of color, the males being red and black on back, neck, tail and wings, while the breast feathers of males and the entire body plumage of females is composed of a ground color of a deep rich bay, each feather bordered or laced, with a narrow edging of deep lustrous black. The Golden Wyandotte has all the good qualities of the Wyandotte family.

Seventy Different Breeds of Domestic Fowls

Wyandottes—(Continued)

Partridge Wyandottes.—This excellent variety of fowls is in color the same as the Partridge Cochins, but in all other respects they are much different. We find in them the same excellent qualities that we do in the older Wyandotte families. They are strong and hardy, and as chicks they develop very rapidly. They are splendid layers of eggs the same color and size as the other Wyandottes, have nice yellow skin and legs, which is very desirable in market poultry; make good mothers, but are not inveterate setters; will hatch their own chicks if permitted to do so. In size they are fully as large as the Silver or White Wyandotte; have nice low rose comb, which makes them particularly well adapted to cold climates.

Silver Laced Wyandottes.—This is the original Wyandotte family. Its introduction was hailed with delight, and it at once became very popular. No one knows what mixture of blood was used in making the breed, but there is reason to believe Silver Spangled Hamburg and White Cochins blood were both used. Silver Wyandottes are very hardy; the chicks mature early, and the hens are fine layers. In the great Australian Laying Competition, a pen of Silver Wyandottes won the first prize two years in succession, each pen averaging more than 200 eggs for each hen in twelve months. In this country a Silver Wyandotte hen has made a record of 804 eggs in four consecutive years. This record has never been beaten. The chicks are ready for market at any time, as they get their plumage at once, and grow up symmetrical and plump. Good Silver Wyandottes are always in demand.

White Wyandottes.—Next to the Barred and White Rocks, probably the White Wyandottes are the most popular breed of chickens and many contend that they are the best all around general purpose fowl. There is no doubt that they are the most popular breed for broilers and are used on the great broiler plants of the country. They are pure white in color, feather out quickly and cover with plumage at a very early age. They have very square, compact, plump bodies. They have a neat, rather small rose comb, wattles are small and ear lobes bright red. They have yellow legs and beak. They excel as layers and especially as winter layers and respond readily to good treatment or do excellent as foragers. For the past few years this breed has crowded all other varieties in numbers shown at the big shows and there is no question of their growing popularity.

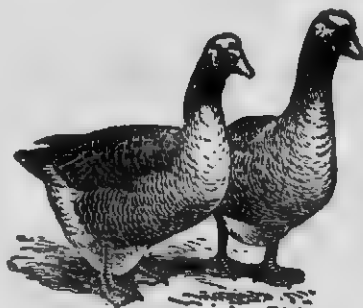
Color Produced by Feed-

It has long been known that food has considerable effect upon color. Yellow or red maize will make most white fowls perceptibly more yellow than white maize or other grain, and much hemlock seed will darken the ground color of a moulting Brahma hen.

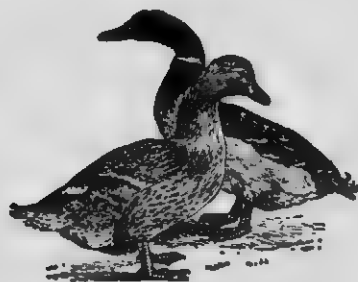
It has also been known for many years that the constant use of iron, whether in natural chalybeate streams or given artificially, tends generally to intensify color, whether in legs, plumage, or yolk of the eggs. The most direct effect of food upon color generally known is in canaries, in which (or rather in some of which, for the effect varies greatly in individuals) the constant administration of cayenne throughout the whole period during which the feather is growing converts a rich yellow into very deep orange-red. This fact, coupled with the success of some breeders in showing rich, deep buff in the many buff varieties of fowls which have become so popular since 1890, has led many to the conclusion that the best specimens owe their fine buff color and other colors like the bay of Golden Hamburgs, their richness, to special feeding even more than to careful breeding, and "color feed" for poultry is occasionally advertised in the poultry papers.—Wright's Poultry Book.

GEESE AND DUCKS

CONVENIENCES NECESSARY IN THIS DEPARTMENT OF POULTRY



Toulouse geese and ganders.



Rouen duck and drake.

MANAGEMENT OF GEESE

The goose cannot profitably be raised in as large numbers as the duck, but still it cannot be termed unprofitable. There are many places on a farm that are worthless for cultivation that could be utilized with excellent results for goose raising. Fields that have streams, branches, or unused springs on them could be turned to good advantage by making them into goose pastures. Many farmers are profiting by this and adding to their incomes annually.

The care and attention necessary for raising geese are very small when compared with the returns, and the cost of food is also proportionately small in comparison with the cost of food used for other birds bred for the market. A goose on range will gather the largest portion of its food, consisting of grasses, insects, and other animal and vegetable matter to be found in the fields and brooks. A free range and access to water are required.

The simplest kinds of houses are used for shelter; these should be built after the plans of those for ducks, but should be proportionately of larger size to accommodate comfortably the number of birds to be kept.

Geese are long-lived birds, some having been known to attain the age of 40 years, while birds 15 and 20 years of age are not uncommon. They retain their laying and hatching qualities through life.

Seven Breeds of Geese—Ponds for Use of Ducks

Ganders should not be kept for breeding after 3 years of age; young ganders are more active and insure greater fertility of the eggs than old ones do; besides, ganders become more quarrelsome with age advances.

Standard Varieties

There are seven standard varieties of geese, as follows: Gray Toulouse, White Embden, Gray African, Brown Chinese, White Chinese, Gray Wild and Colored Egyptian.

All breeds of geese, except perhaps the Egyptian, are to be recommended to farmers who keep a limited number in addition to other poultry and allow them the freedom of the farm; but when goose raising is to be more extensively engaged in, the African goose is to be especially recommended. It is the quickest to mature, most prolific, and the easiest to handle of all varieties.

In breeding African geese mate two geese to one gander, and it will be still better if pairs are used to secure better fertility of the eggs.

The most satisfactory results are to be had by breeding pure

standard-bred stock without crossing. But for those who are partial to crosses the following are considered the best to make: (1) Wild gander on African goose; (2) Embden gander on Toulouse goose; (3) Embden gander on African goose; and (4) Embden gander on White China goose. These crosses will give good growth and the young birds will dress well for the market. Crosses should only be made for market purposes, and should always be bred from original stock.

Fattening Young Geese

To fatten young geese, place them in a pen, not too large, so that they will not exercise too much, and feed three times a day all they will eat up clean of the following: Corn meal mixed to a dry, crumbly state, and beef scraps amounting to 20 per cent of the bulk of the corn meal.

While fattening young geese, they should be kept as quiet as possible; no excitement whatever should disturb them. When feeding approach them quietly, and do not irritate them in the least or they will not fatten, but will

"throw out" or grow another crop of feathers. At 10 weeks of age, or when the tips of the wings reach the tail, they are ready for market and should weigh between 8 and 10 pounds.

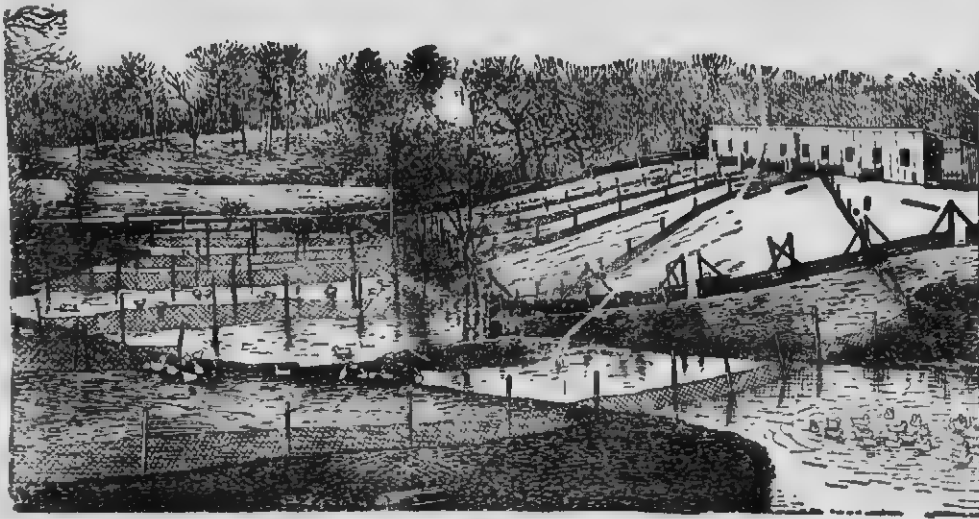
Young geese should be marketed in October. It is best to market all possible before cold weather sets in. It is much harder to dress a gosling in cold weather. The feathers set tighter, and in picking them the flesh is torn.

Good Setters and Mothers

Almost all breeds of geese are good setters and attentive mothers, and if left to themselves will make their nests, much as when wild, and hatch a large percentage of their eggs. But hens are now more frequently used for hatching goose eggs, as by taking the eggs from the geese when laid and giving them to hens to hatch, the goose will lay a greater number of eggs than if she were permitted to set.

The feathers of geese are an important source of revenue and find a ready sale in the markets. A goose will average about 1 pound of feathers a year.

SHOWING HOW STREAM MAY BE USED FOR RAISING DUCKS



House for breeding ducks, showing water runs.

RAISING DUCKS FOR MARKET

Duck raising has been developed into a flourishing industry within the last twenty-five years. Prior to that time the duck was not considered a profitable bird to raise. Its flesh was never esteemed very highly by the general public. Ducks were raised without constraint in waterways, feeding mostly on fish and water insects. This food gave the flesh

a strong fishy flavor; hence it was not particularly sought after, save by the few who were partial to that class of diet. The duck centers of Long Island and New England were then producing a limited number each season, and it was with difficulty that these were sold with any profit.

In recent years, however, artificial incubation and brooding,

combined with judicious feeding, have been instrumental in the development of the industry. Machinery enables the duck raiser to have his stock in the markets when prices are the best, and also to raise large numbers of birds in a limited space of time. The season for raising ducks is about six months—from February to July, inclusive.

The Twelve Standard Breeds of Ducks in This Country

SIX BREEDS AS FOLLOWS:

1. White Pekin
2. White Aylesbury
3. Colored Rouen
4. Black Cayuga
5. Colored Muscovy
6. White Muscovy

The novice will do well to begin by studying the methods employed by successful duck raisers, and to use only the most approved buildings, appliances, and plans of feeding and care.

Duck raising is to be recommended to farmers as a profitable source of revenue. There are numbers of farms in this country today that are devoted exclusively to raising ducks, averaging from 5,000 to 30,000 ducks as an annual output. An idea of the proportions of the business may be had from the fact that as high as three tons of feed are used daily by a single raiser during the busy season. The profits are the very best, and good incomes may be made when once the business is thoroughly mastered. But the reader should not jump to the conclusion that these results can be easily obtained. Duck raising is an arduous task; one that requires an apprenticeship and absolute knowledge of the business before success is reached.

The average farmer has all the facilities for raising a goodly number of ducks, and may with a little outlay add considerably to his income.

It is at all necessary that ducks should have access to water to be raised successfully, for they grow and thrive as readily without it. There are successful plants where thousands of ducks are raised that have no water, save that which is given them as drink.

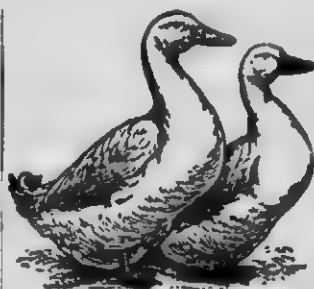
Without Water

Some duck raisers use water in ponds, etc., and allow their breeders the freedom of it; some allow the growing stock intended for market free access to water until they are eight weeks, when they are penned and fattened for market. On the other hand, there are raisers having no water on their farms, except in wells, who are just as successful and raise as many birds as those who have the water.

The only noticeable difference between "upland" and "water" ducks is that the latter are of cleaner and prettier plumage than the former.

There are twelve standard varieties of ducks raised in this country, as follows: The White Pekin, White Aylesbury, Colored Rouen, Black Cayuga, Colored Muscovy, White Muscovy, Indian Runner, Gray Call, White Call, Black East India, Crested White, and Blue Swedish. Of these varieties, the first seven are considered profitable to raise; the two varieties of Calls and the Black East India are bantams, and are bred more for the show room; the Crested White may be considered as almost purely ornamental, while at present but little is known of the Blue Swedish in this country.

Of all the ducks for farm and practical purposes none stands



White Pekin duck and drake.

higher in popular esteem than the White Pekin. It is valuable for raising on a large scale and is the most easily raised of all. It is a very timid bird and must be handled quite carefully. It was imported from China in the early seventies, and has steadily grown in popularity since its introduction into this country. These ducks are large, they are the best of table fowls and excellent layers.

The Colored Rouen duck is deservedly popular throughout this country, and is considered one of the most profitable varieties to keep. These ducks are said to have come originally from the city of Rouen, in Normandy. The flesh is considered very delicate and the breed is easily fattened.

The Black Cayuga is distinctly an American duck, having been bred so long in this country that all trace of its origin is lost. It is said that it was first found in the central part of New York. It is a good practical duck to keep, though most duck raisers prefer the white-feathered birds.

Buildings for Breeding Ducks

Houses for ducks are simple affairs. They are built plain and comfortable, and have no furnishings whatever. A duck is differently constituted from a hen, and must be cared for under different conditions. The hen needs warmer houses and drier surroundings than does the duck. A duck does not mind the cold if she can keep her feet warm. Cold feet will affect a duck as a frozen comb does a hen, retarding laying and inducing ailments. The feathers of a duck are almost impenetrable and will withstand almost any degree of cold. Then again, a duck cannot stand the amount of confinement in a house that a hen can; she is more restless in disposition and is given to exercise in a greater degree than is a hen.

The duck house can be built of rough boards, 12 inches by 1 inch, and the joints covered by 3-inch by 1-inch strips. The roof should be made water-tight and covered with roofing-paper, shingles or tin. The outside should be well drained around the bottom, that it may not be damp.

If the house is well drained on the outside and the earth floor is covered with hay, straw, or leaves, it will be perfectly satisfactory. There must not be dampness in the house, as the birds

SIX BREEDS AS FOLLOWS:

7. Indian Runner
8. Gray Call
9. White Call
10. Black East India
11. Crested White
12. Blue Swedish

will not do so well; while they are given to water on the outside, they must have comfortable quarters in which to "warm up" or "dry out."

It is not necessary to provide nests for ducks. More than half the eggs are laid on the floor of the house or in the yard, and, if permitted, a duck will build herself a nest to her liking.

An inclosure should be given the breeding ducks, as they do better confined than when at liberty.

Care of Ducklings

Most duck raisers who operate on a large scale plan to have a "warm brooder house" and a "cold brooder house." Young ducklings, when taken from the nest or incubator, are very delicate and susceptible to the changes of the atmosphere; they must be kept very warm and free from chilling. The first three weeks of a duckling's life are the most critical period, and after that time the liabilities of loss are reduced to a very low rate—hardly five to the hundred.

The front of brooders for young ducklings should be hung with strips of woolen cloth to keep in the warmth of the brooder. The greatest care should be given them at this period; duck raisers consider it the most important part of their work, and after a bird has passed this "critical age" it may be counted on for the market.

The duckling goes from the warm brooder house to the cold brooder house. When the birds are taken from the warm brooder house they are three weeks old and of sufficient age to withstand a cooler temperature. They do not need the extra heat of the warm house, and in it would not grow nearly so well. The size of pens in the growing house is larger, and the ducklings are not crowded so many in a pen. The brooder houses are, of course, equipped with a system of heating that can be easily regulated.

When Salable

Ducklings are kept in the cold brooder house until they are 6 or 7 weeks old, when they are transferred to larger "growing houses." It is here that they are pushed for the market until they are 10 weeks old, when they are salable. There is no heat in the growing houses, which are used only as a means of shelter during the early spring months. When the weather is well advanced, the ducks seldom take to the houses at night, they prefer the outside and spend their nights on the ground. The growing houses should be abundantly ventilated, as too close an atmosphere will do more harm in a single night than if they had not been housed at all.

What to Feed Ducks—How and When Feed—Cost of Raising

Supplying Water

As has been previously stated, water for bathing is not at all necessary for growing ducks, but a liberal supply for drinking is absolutely essential to their growth. The food of the duck is such as to require drink when eating, as it is comparatively dry and cannot be eaten hurriedly, as grain is. When feeding, always replenish the water troughs or fountains with pure fresh water.

Feeding Ducks

The food of the duck is both vegetable and animal in nature. In the wild state it gathers its food from brooks and marshes, consisting of flag, grasses, small fishes, water insects, etc. When the birds are raised in confinement this diet must, in a measure, be imitated to get the most satisfactory results.

The duck has no crop, the food passing directly from the throat to the gizzard, and as a consequence the food must be in a soft mushy state. Too much hard food, such as grain, does not agree with these birds and they cannot thrive on it. While some raisers use a small allowance of grain others do not, and it has not been proved to be of any advantage to feed it. Soft food is the duck's natural diet, together with grasses, vegetables, and animal food.

Method of Feeding

It costs from 6 to 12 cents a pound to raise a duck for market at ten weeks of age. It costs from \$1.75 to \$2.50 each to keep breeding ducks a year.

The usual hours for feeding are 6 a. m., 10 a. m., 2 p. m., and 6 p. m.

Below is given a system of feeding ducks for marketing at ten weeks of age, as used successfully by one of the largest duck raisers on Long Island. It is divided into three parts, as follows:

(1) From time of hatching to seven days old, feed equal parts by measure, corn meal, wheat bran, and No. 2 grade flour, and 10 per cent of this bulk coarse sand. Mix with water to a dry crumbly state and feed four times a day.

(2) From seven to fifty-six days old, feed equal parts by measure, corn meal, wheat bran, and No. 2 grade flour; 10 per cent of this bulk beef scraps; 10 per cent coarse sand, and 12½ per cent green foods (green rye, oats, clover, etc.). Mix with water to a dry crumbly state and feed four times a day.

(3) From 56 to 70 days old, feed two parts by measure, corn meal; one part wheat bran; one part No. 2 grade flour; 12½ per cent of this bulk beef scraps; 10 per cent coarse sand; 12½ per cent green food. Mix with water to a dry crumbly state and feed three times a day—morning, noon and night. Give last feed an hour before sundown.

When ducks are raised for breeders they are fed differently

from those intended for market. They are not forced so much as are the latter, and less fattening food is given them. The corn meal and beef scraps are reduced to one-half quantity used in the above rations. The following is an excellent ration: Equal parts corn meal, wheat bran, green food, 5 per cent beef scraps, and 5 per cent coarse sand or grit.

Grit in some form is essential to ducks, and should be kept before them at all times. Many overlook this fact, and do not seem to understand that it is of as much value to them as it is to chickens.

Hatching Ducklings

Hatching under the setting hen (generally used for hatching ducks) is what is termed the natural process of incubation. The hatching of eggs by this means has always been followed, and no special skill is needed for success, provided the eggs are well fertilized with healthy germs. Many who raise ducks in large numbers, however, use almost exclusively artificial means; some use both the natural and the artificial, while others use the artificial entirely.

There are many thousands of ducklings hatched by artificial means each year, and numbers of good mechanical incubators are now manufactured in this country at low prices. The methods of artificial incubation for ducks are in general similar to those fully described in the article on the incubation of chickens.



Colony Houses. View of Michigan Poultry Farm, Lansing, Mich.

Separate Houses

The colony house system consists of having one flock of one colony in one building. Colony houses are of two types, the portable and non-portable. The portable type of colony house has many advantages, especially for growing young stock. The usual method is to nail them on runners and then have a team draw them from place to place as wished.

This type of house saves much feed which has been wasted in the fields. You may draw the house into the grain field after the crop has been harvested, and then, after the oats is cut, the house and chickens can be moved into the oat field, etc. In this way stock is always kept on clean ground and gets more insects than would be possible when kept around the farm buildings.

Setting Hen

The setting hen must have her daily care and attention, just like the incubator.

One of the best foods for setting hens is whole corn or corn chop, together with green food, grit and fresh water. Place the corn and water in front of the nest so that during the first day or two the hen will not have to leave her nest to eat and drink. On the third day release her and scatter the ground.

Try to so arrange that she can get bath. A formula for good dust bath is equal parts of coal and land plaster and fine sand, and some lice powder. Let the hen remain off the nest for about five minutes. The next day take her off at the same hour, if possible, and from then on she may stay off the nest until the eggs are cooled to blood heat.

Stop Desire to Set

To stop a hen from being broody, place her in a small crate or wire exhibition pen with a slatted bottom, so that she has nothing substantial to sit upon. You should then place the crate or pen in the run with the other birds, and place the broody hen in the same, then commence to feed her very sparingly indeed, but supply her with plenty of drinking water.

The broody hen should not be fed until some time after you have fed the other birds, but she should be placed near the other birds when you are feeding them. After the broody hen has been kept in the above structure for a couple of days, all signs of broodiness will have been suppressed without doing the bird any harm.

The Six Standard Breeds of Turkeys

THE NARRAGANSETT THE BUFF TURKEY THE BRONZE TURKEYS Standard Varieties and Management

No other kind of domestic poultry has come into such general use throughout the entire world for holiday feasts as has the turkey. Market statistics show that there has been an active demand for turkeys for many years past and the best birds invariably bring good prices. In fact there is no kind of poultry more profitable than turkeys when properly handled.

The fact that from the time they are six weeks old until winter sets in, turkeys will gain the greater part of their entire living from bugs, grasshoppers and waste grain that they pick up in their wanderings over the range, assures their existence during this period at little or no cost to the grower. In other words, they may be termed self-sustaining foragers where they have sufficient range.

Preferred Weight for Market

Turkeys that are hatched early in the spring should grow to weigh from 14 to 30 pounds by Thanksgiving week. These weights are often exceeded by the best growers, but as they are the most popular and most readily produced, they are suggested as the most advisable.

The average yield of turkey hens is from 18 to 30 eggs, each of which can usually be counted on to produce a living poult. The question of profit from keeping turkeys simply resolves itself into the ability of the grower to bring them to a marketable size. This can readily be done if care and attention be given to all the requirements for success.

Six Standard Varieties

Six standard varieties of turkeys are more or less grown in this country, viz: Bronze, Narragansett, Buff, Slate, White, and Black. The main differences are in size and color of plumage. The Bronze and the Narragansett are the largest, the Buff and Slate are the medium, and the Black and White the smallest.

Roosting Places

Turkeys do better when they can roost in the open. If well fed, they will thrive more in the shelter of the trees than in a close, confined house. The troubles that arise from allowing them to live in the trees are that they



Bronze turkey cock.

become wild and frequently are stolen. If housed, their quarters should be airy, roomy, and perfectly clean. It is not wise to have them roost with other poultry.

Origin of Varieties

Our domestic turkeys have all been bred from the wild turkey of the United States and Canada and the wild turkey of Mexico. Climatic conditions have prevented the Honduras, or Ocellated, turkey from playing any considerable part in bringing the domestic turkey to its present state of development. The wild turkey of North America has for the most part been used as the foundation from which size and vigor in our domestic stock have been gained. As to the origin of the White variety, nothing that may be classed as authentic is recorded. The Black may have come from either of the wild varieties as sports, and the same may be said of the White.

The Bronze turkey holds the post of honor. It probably originated from a cross between the wild and the tame turkey. Its beautiful rich plumage and its size have come from its wild progenitor. To maintain these desirable qualities, crosses are continually made. In this way the mammoth size has been gained. Their standard weight ranges from 16 to 36 pounds, according to age and sex. Probably more of this variety are grown each year than of all others.

Selection of Breeding Stock

A few plain rules which may be observed in the selection of breeding stock are as follows:

1.—Always use as breeders turkey hens over one year old. Be sure they are strong, healthy, and vigorous, and of good medium size. In no instance select the smaller ones. Do not strive to have them unnaturally large.

2.—The male may be a yearling or older. Do not imagine that the large overgrown males are the best. Strength, health, and vigor, with well-proportioned medium size are the main points of excellence.

THE SLATE TURKEY THE WHITE TURKEY THE BLACK TURKEY

3.—Avoid close breeding. New blood is of vital importance to turkeys. Better send a thousand miles for a new male than risk the chance of inbreeding. Secure one in the fall so as to be assured of his health and vigor prior to the breeding season.

The best rule for mating is to have four or five females to one male or tom.

Egg Laying

The hen turkey will begin laying from the middle of March to the first of April. In the warmer localities they begin to lay even earlier than this.

A feature of vital importance is assured fertility of the eggs. As soon as the hen turkey has paired with the male she gives but little attention to him. The time, being fully intent on locating a nesting place where she can lay her eggs.

It often occurs that the hen will begin to lay at a time when changeable weather may endanger the vitality of her eggs. She should be closely watched in her wanderings, so as to locate her nest and gather the eggs in order to protect them from the cold nights that may come at this early season of the year.

Hiding Nests

If unrestrained, the hen will naturally select some secluded place, under a pile of lumber or logs, or in the brush, for example, where she can hide her nest, hatch, and bring out her young after her natural inclination. If she selects a place which is not well protected, it is better to provide a box or coop, with a suitable opening for ingress and egress, to protect her and her eggs from the weather during the four weeks of incubation. In addition to this, a slate or lath frame may be placed over her a short time prior to the hatching of the eggs, so as to prevent the hen from wandering away with the young poult as soon as hatched.

Those who favor the "perfect liberty" plan may secure larger flocks by following the above suggestions. Good care should also be given to the feeding of these semi-wild flocks while young and in unusually wet weather.

When the grower wishes to save all the eggs laid, provision must be made against the hiding of nests by shutting the hens into inclosures. In this way they may be taught to lay in prepared nests where they will set when broody. From these inclosures they may be given freedom to roam about after 3 or 4 o'clock each day, after they have laid. When roosting time comes, either coax or drive them back if they do not go voluntarily. By so doing one may have eggs to sell or set at will. Turkey hens will lay from 15 to 20 eggs before becoming broody.

Facts About Turkeys

Wide Range Necessary

It is not advisable to keep turkeys on a small confined place. Some have done well with them on from 8 to 20 acres, but only a few can be grown in this way and by the exercise of constant care.

A wide range of territory for them to go over undisturbed is of vital importance, here they will select the kind of food most to their liking. In the early spring and summer season such a range furnishes plenty of food and exercise for the breeding stock, and later the finest feeding grounds for the growing poults.

If it is found necessary to confine them, all that is needed is a shed or house that will protect them from the elements and marauders of all kinds, and at the same time not be too confining for them. Place the roosts well up from the floor, and keep the interior perfectly clean and free from vermin.

In localities where it is not too

cold during the winter months, it is better to allow the breeding stock to roost out in the open, either in the trees, or upon roosts prepared for them by planting posts that project about 8 feet above the ground. Upon these place long poles about 2 or 2½ inches in diameter for roosts. Roosting places of this kind are better sheltered when located on the south side of a barn or building.

Hatching

Turkey hens produce such a limited number of eggs that it is seldom necessary to use an incubator for their hatching, as the hens themselves can hatch all they lay, or nearly all. Sometimes turkey eggs for hatching are given to chicken hens of large size and the poults they bring from the eggs are given to the turkey hen to rear.

It takes from 27 to 29 days for turkey eggs to hatch. The eggs

are usually fertile and quite often each egg in the nest will produce a living poult.

Some turkey hens will rear two broods in a season when permitted so to do.

While incubating their eggs the hens should be supplied with food and water, these should be placed close at hand where they may go to them at will, or their coming from the nest, as they will each day, should be observed so that they may be fed and watered. Good sound wheat and corn are best for their food at this time.

Growing the Poults

The most difficult part of turkey raising is to know how to care for the poults. It will be necessary to learn from actual experience what to do and when to do it, as well as acquiring a knowledge from other breeders and from study of standard works on the subject.



Squabs ("squeakers"), 24 hours old.

Squab Raising

The raising of squabs, or young pigeons, for the market has been made a profitable business by many farmers and suburban residents in recent years.

The standard size for squabs is 8 pounds to the dozen, the birds being killed before they get so large that they leave the nests.

It will pay to go into the pigeon business for squabs only provided one gets the right kind of stock and gives careful attention and proper management.

The best breed to use for squab raising is straight Homers or a cross between them and Dragons. Successful breeders use Homers almost exclusively, because they are the best workers and feeders and raise larger squabs in four weeks' time than any other variety. By a cross of straight Homers with Dragons you get a larger squab in four weeks' time than with

straight Dragons. A pair of straight Dragons requires five weeks to bring squabs to market size, but the cross will result in a larger squab which can be put on the market in a little over four weeks.

Housing and Feeding

One large pigeon house is better and more economical than several small ones, but in no case should a house be built to accommodate more than 250 pairs. If larger numbers are to be kept, more than one house should be built. A room 8 by 10 feet will accommodate 50 pairs very comfortably. The fly should be extended 32 feet if possible.

Pigeons should be fed twice a day—in the summer time at 6:30 a. m. and 4:30 p. m., in the winter at 7:30 a. m. and 3 p. m.

The best kinds of feed to use

are cracked corn, red wheat, Kafir corn, millet, peas, hemp, and rice. In the morning give wheat, cracked corn, and peas in equal parts; in the afternoon give equal parts of cracked corn, as, Kafir corn, and millet. The birds should be fed in the pen rather than in the fly.

Water birds every morning before feeding, using nothing except fresh pure water. Always clean out the fountain before filling.

Points for Squab Raisers

Bathing is very essential to the health of pigeons. In summer they should have an opportunity to bathe at least every other day. In winter the bath should be given only on bright, sunny days.

It is essential to clean house once every week. After cleaning the nests, put powdered carbolic lime in all cracks, corners, a

Ways of Preserving Eggs

damp places. Sprinkle the floor with lime and sprinkle a bucket of sand evenly over the lime.

A practical New Jersey breeder with 425 pairs of pigeons produced in one year 4,400 squabs for market. Anyone with good stock and giving as good care and feed ought to do as well.

Common causes of chilled eggs and dead squabs are fighting cocks, unmated birds, mice in the breeding quarters, and lack of vitality in the breeding stock.

In the purchase of breeding stock, the buyer should endeavor to secure young, vigorous, mated birds, free from disease and lice. He should secure all available information about the birds offered, and, if possible, a written guaranty.

Number of Females

Of the light, active breeds, such as the Leghorns and Minorcas, 1 male will be sufficient for a pen of 12 to 15 females under ordinary conditions.

In the case of the medium-sized fowls, such as the Plymouth Rocks and Wyandottes, 1 male should be provided for every 10 or 12 females.

With the heaviest breeds, like the Brahmas and Cochins, 1 male should not be mated with more than 10 females. Where 20 or 30 females are kept in one flock no better means of securing fertile eggs is known than to keep 2 male birds, allowing one of them to run with the hens one day and the other the next day, having a coop or extra pen in which to keep the one not with the hens.

Overcrowding

Overcrowding is the father of a peck of troubles.

Overcrowding makes overfat hens, and overfat hens lay soft shelled eggs and the egg eating habit follows. Overcrowded flocks will roost closely together at night and sweat, leaving them in a weakened condition resulting in sickness. Overcrowding also produces idlers. Idle hens become mischievous hens, and the disgusting vice of feather pulling is the result. Better results in both health and egg production come from flocks that have plenty of "elbow room."

Perches

The perches should be all on the same level in the warmest part of the pen away from drafts, and should be readily removable. If the perches are not all on the same level the fowls will fight for the opportunity to roost on the highest and the chances are that many fowls will be injured by falling off the perches.

The perches should be in the warmest part of the pen as they need the most protection from the cold during the night when the fowls are inactive. At this time the house is also usually colder than during the day. The perches should be easily removable to facilitate cleaning, disinfecting, and fighting mites. They should be so constructed that a disinfectant can be readily applied to all parts. They should be as simple as possible and made in such a way as to have the smallest number of cracks and crevices which offer

hiding places for mites and other vermin.

As a general rule small hens should have about six inches of perch space while the larger hens should be allowed eight inches. In the winter they huddle closer together, but in the summer there should be plenty of room to allow them to spread out.

Perches should be twelve inches apart and not closer than fifteen inches to the wall or ceiling. Show birds, especially Leghorns, or similar types should be kept at a greater distance from walls and ceilings. Many good birds are spoiled by "brooming" their tails against the walls.

PRESERVING EGGS

Many people wish to preserve eggs for home consumption, and so a few methods are given which have proved sufficiently satisfactory to warrant the preservation of eggs for home use.

Eggs to be stored should be:

First, from hens that have no males running with them, because an infertile egg keeps longer, even without the use of a preservative, than a fertile egg; second, perfectly fresh, for not only will they keep much better, but if an egg which has begun to decay is placed in the same vessel with fresh ones it is likely to affect all the surrounding eggs; and, third, perfectly clean, for filth of any kind adhering to the shell will taint the preserving medium and thus taint the other eggs.

In placing eggs in the preservative be careful not to crack the shells. Keep them in a moderately cool room where the temperature may be kept fairly constant. A dry, clean cellar is a suitable place.

Water-glass.—Of the many methods which have been tried for preserving eggs on a small scale none has proved more successful than the use of water-glass (sodium silicate). This is a very cheap product that can usually be procured at not to exceed 50 cents a gallon, and 1 gallon will make enough solution to preserve 50 dozen eggs, so that the cost of material would not exceed 1 cent a dozen.

Pure water that has been boiled and then cooled should be used. To each 15 or 20 quarts of water 1 quart of water-glass should be added. The solution should be prepared, placed in the jar or other suitable vessel, and the fresh eggs added from time until the jar is filled, but be sure that there is 2 inches of the solution, covering the eggs. The eggs should not be washed before packing, for washing injures the keeping quality, probably by dissolving the mucilaginous coating.

Lime-water.—A good lime-water preservative may be made as follows: Thirty gallons of water, 10 pounds of salt, one-half bushel of finely slacked lime. After mixing thoroughly allow the solution to stand two or three days and then remove the clear liquid by dipping or by means of siphon. Place the liquid in a tub or other suitable receptacle and place the eggs therein, or the eggs may be placed in the vessel first and the lime-water poured over them. Have about 2 inches above the eggs. Limed eggs can be discerned by the roughness of the shell.

Before boiling eggs which have been preserved in the foregoing ways, the shell should be punctured with a needle, otherwise it is apt to crack as soon as placed in hot water, owing to the pores being closed.

Salt and bran.—Eggs can be preserved for several months in dry salt. Have at least 2 inches above the upper layer of eggs.

Packing in bran has also been found satisfactory in many cases.

Cold storage.—This is undoubtedly the best and most practical method for preserving eggs in large quantities in a commercial way. As the processes by which a low temperature can be maintained for an indefinite period have become more and more improved the greater has been the number of eggs so stored, until the cold storage business has reached such proportions that it has a considerable influence on the price of eggs, tending to lower it in the winter and raise it in summer.

Scratching shed.—Questions are often asked as to the size of scratching sheds. A useful one to accommodate nine birds should measure not less than 10 ft. by 6 ft., and any height from 3 ft. upwards.

The shed may be made in five separate pieces, namely, one roof, which should be constructed of $\frac{1}{2}$ -in. match-boarding, and covered with some good strong felt. It is better made 1 ft. wider than the shed itself, and about 4 in. longer, so that there are a couple of inches projecting over each end, about 3 in. over at the back, and the remaining 9 in. at the front, so as to keep the rain from beating in. The two ends should be made the same size, and should also be constructed of $\frac{1}{2}$ -in. match-boarding, likewise the back, which should be about 18 in. less in height than the front. The latter should be constructed of stave of wood and partly of wire netting; the bottom half should be boarded up to within 3 ft. or 4 ft. from the ground, and the remaining portion covered with 1 in. wire netting. A door should be made in one of the ends to allow admittance, and likewise a slot for the fowls.

The scratching shed should not have a wooden floor, but should stand upon the bare earth; it should be covered with some kind of litter, such as cut straw chaff, oat husks, peat moss, or dead leaves.

When feeding the birds on grain, scatter the food among the litter to provide them with exercise necessary to keep the birds in a healthy, active condition, and for the same purpose hang up any green food supplied to them, so that they have to reach or jump for it.

Setters and non-setters.—Most of the varieties of poultry come under light or heavy breeds, the former being considered non-setters, and among their ranks are the following:

Leghorns, Minorcas, Andalusi-ans, Anconas, Campines, Redcaps, etc.; and the latter (heavy breeds) are considered setters, and under that heading are the following: Orpingtons, Rocks, Wyandottes, Brahmas, Cochins, Sussex, Rhode Island Reds, Faverolles, Dorkings, Langshanks, etc. The light breeds are all suitable for confined runs, and lay chiefly during the spring and summer time.

All of the heavy breeds are good winter layers, but when kept in confined runs, great care has to be taken to keep them active and from becoming over-fat and then not laying.

Things Necessary to Know About Incubators

Eggs for Hatching

The eggs intended to be incubated should be kept at a rather cool temperature, 50 degrees to 60 degrees Fahrenheit. It is not advisable to keep them longer than two weeks before being incubated, and the fresher they are when set the better the chances of a good hatch and strong chicks.

Only well-formed eggs with good strong shells should be set.

How Many Eggs for Setting

Number of Eggs to Hen.—This depends on the season, the size of the hen, and the size of the eggs. The usual number for an average-sized hen in the spring is 13. The same hen set in winter should not be given more than 11. After the middle of May she can take care of 15. It is better to give less than she can cover than to give more, for when too many are given most of the eggs, if not all, will be chilled at some period of the incubation.

Testing Eggs

Testing the Eggs.—Each sitting should be tested for the removal of the infertile eggs, which gives a better chance to those left. If there are many infertile ones, and several hens have been set on the same day, some of the hens may be reset. The eggs should be tested about the sixth or seventh day. Egg testers are sold by incubator manufacturers and by dealers in poultry supplies, or a homemade tester can be made in a few minutes from a small pasteboard or wooden box of such size and dimensions that a common hand lamp, a lantern, or a candle can be placed in it. A hole should be cut in the top directly over the flame and another a little smaller than an ordinary sized hen's egg in one side opposite the flame. The testing should be done in a dark room. If the pen in which the hens are set can not be made dark enough, it is best to test after dark. In testing, the light shining through the egg, held against the hole in the side of the box, shows the condition of the egg. An infertile egg is clear, while the fertile egg will show a spiderlike formation, a center with long, crooked threads, leading outward, and this formation will float as the egg is turned. The infertile eggs may be removed and used for cooking purposes.

Feed for Fattening

Fattening birds should always receive abundant soft feed. As they have no exercise they require a feed that can be quickly and easily digested. The following mixture is good: 100 pounds finely ground barley, 100 pounds finely ground corn, 100 pounds finely ground oats (with hulls sifted out), to which mixture is added 10 per cent of beef scrap. Buttermilk or skim milk is used for mixing, the former being preferred. A little salt is sometimes added. The birds are fed twice a day at intervals of twelve hours, and are

crammed for about three weeks. It is important that the intervals between the feedings should be as nearly equal as possible.

Another ration may be made as follows: 100 pounds ground oats, 100 pounds ground corn, 50 pounds flour, 4 pounds tallow.

Green Bone

Fresh bones cut up in a bone cutter especially made for cutting bones to be fed fowls. Fresh cut green bone fed to laying hens confined in winter quarters will help the egg production, as it contains a large amount of protein needed to produce eggs in winter time in cold climates. Bone cutters are generally sold by all poultry supply houses and green bones for cutting may be purchased of any retail butcher.

Grit

Grit is essential to the health of fowls and to economy in feeding. Grit takes the place of teeth in preparing the food for further digestion and is required for the proper preparation of feed in the gizzard. When the feed is not properly taken care of in this organ an undue strain is thrown on the fowl's system, often resulting in disease, and also allowing much of the nutriment to pass through the bird's body without being absorbed. In every pen or yard a box of grit should be kept. Recent investigators have asserted that grit is a part of the necessary feed, giving the fowls strong bones and a bright plumage.

Cost of Feeding

How much does a hen eat?—This question is perhaps best answered by the statement that a hen eats as much as you feed her; but we can give the following statistics: The Maine experiment station, in the course of recent tests extending over a period of one year, found that a hen in this time consumed 90 pounds of grain and meal mixture, 40 pounds of oyster shell, 2.4 pounds of bone, 2 pounds of grit, 2.4 pounds of charcoal and 10 pounds of clover. These materials cost the station \$1.45. This is about the average cost per hen for most poultry men, although we have known many experienced men who claim to have reduced the cost much below this. It is, perhaps, higher than the average farmer pays to feed his hens, but it is a fair estimate for those men who raise chickens as a business.

Artificial Hatching

Incubators.—There are several good incubators on the market, any one of which, if properly handled, will be found satisfactory.

More depends on the operator in most cases than on the incubator. In buying an incubator the order should be placed early without waiting until the purchaser wishes to begin operating it.

Spring is a busy time for the incubator companies, and it is often impossible for them, no

matter how well equipped they may be, to fill an order the same day it is received. Again, shipments are often delayed by the transportation companies. It is also advisable for every beginner to have his machine some time before he desires to fill it with eggs, in order that he may become fully acquainted with its operations. A book of instructions accompanies every incubator, which makes it unnecessary to go into details here.

Probably the most common cause of failure with incubators is carelessness and neglect in attending to the machines.

Incubator Cellar

An ideal incubator cellar is a very valuable factor on a large poultry farm, or in case enough eggs are to be incubated each year to make it necessary to operate several machines. Otherwise, a clean, well-ventilated dwelling-house cellar, or other room, with proper precautions may be used.

If a cellar originally designed for other purposes is available it should be thoroughly cleaned. Good ventilation should be provided, and it may be obtained by opening the windows and placing a thin muslin curtain over each opening. There should be at least two windows arranged in this manner even when only one machine is operated.

In very cold weather the windows may be partly closed, especially on cold nights. When a cellar is not available, a room above ground may be used, but the best conditions for successful artificial incubation prevail in a room that is partly under ground. There it is easier to keep an even temperature and to retain moisture. If possible, incubators should be operated in a building used for no other purpose.

Location.—If a cellar is to be built especially for the incubators, a site should be chosen far enough from the other buildings to avoid great loss from fire in case of accident, but not so far away that it would be inconvenient to reach.

Sloping ground presents an ideal condition. The building may then be erected parallel to the slope, having one end of the incubator room in the slope almost entirely below ground, the other end coming out above ground, or nearly so, thereby making it possible to secure good air and drainage.

The Building.—A high ceiling is especially beneficial. A room ten feet high and with a distance of seven feet from the floor to the bottom of the windows is very satisfactory.

If properly placed, windows are not at all objectionable in an incubator cellar. If hinged at the bottom they may be allowed to drop part-way open and there be securely fastened by a small chain or strong cord. In this way the air passes over them and into the room, an arrangement that does not permit direct draughts to reach the incubators.

It is also advisable to place muslin curtains over the windows that are left open permanently, the other windows affording most of the light. The latter may be shaded in case the sun shines through on the incubator or affects the temperature of the

Money in Eggs and Poultry

MRS. BERRY IN "PROFITABLE POULTRY"

When contemplating going into a business of any description, the question naturally arises: Is there any money in it? And a thorough investigation is made with that one object in view.

Now, when we say that there is money in eggs and poultry, it is not an utterance from a phonograph, but backed by human intellect and experience. I do not make the assertion because some one else has told me, and thus believed it and thought there ought to be money in it; or figured it out on paper; but I positively know it to be a fact.

What other one thing is there such a demand for as poultry and eggs? In fact, the demand is so great that prices for eggs always range from 15 cents to 30 cents per dozen and in many localities as high as 30 cents. This in itself shows that a good flock of hens is as good as a U. S. mint.

How many a family is supplied with daily food and wearing apparel from a good bunch of poultry. If plenty of range can be had, the cost of feed is comparatively nothing, and all the income a profit.

There is money in a bunch of sows, or a mixed lot of chickens, but there is more money in a good flock of pure bred fowls; they will lay more eggs, and bring higher prices on the market, they thrive better and grow larger, and besides all this, how much prettier a flock of chickens all of one variety look than a bunch of mixed up birds, and how much more satisfactory they are. A great deal depends on the start.

Best Time to Go Into the Poultry Business

There is no time like the present to go into the poultry business. Just the sooner you get into it the better. Hard times will not affect it like other lines. There is always a good demand for poultry products and at a profit. The prices may vary a little and go up and down like all commodities, but it never gets so low that it is not profitable. So if you are contemplating entering the poultry business some time, act now and make the start at once. Remember now is the acceptable time.

Six Hundred Million Dollars

That sounds pretty big, don't it? Well, that is the size of the pile added to the nation's wealth by the poultry business last year.

Have you a part of it to jingle in your pockets, or for pin money? If not, then you are missing a good thing.

The poultry business offers better chances for more people of all classes and all conditions every place than any other line.

The poultry business cannot be overdone.

There may be a good many mistakes made in starting, but the conservative person who starts right and then goes ahead and plans his work along right lines and proceeds with care, knowledge, and judgment, will win out as thousands and thousands are doing.

Who Can Enter the Poultry Business?

There is no other business that will admit such a number of people, with a full assurance of success as that of poultry. They can come from all the walks of life, all vocations, all classes, all peoples and make the poultry business a profitable one.

As it is a very healthy business, much of the work being out of doors and the work not hard, thousands of broken down business men, clerks, worn out traveling men, railroad men, miners, tradesmen, machinists and professional men who are eking out a scanty existence in overcrowded professions are turning to this industry.

Thousands of maidenly inclined school teachers, shop ladies, dressmakers, factory and sweat shop women, lady clerks with overstrained nervous systems and their vocations becoming a burden to them and the profits only making them a scant living, could take up the raising of poultry with great advantages for bettering their conditions. In the work of poultry raising, they would be gaining in health, obtaining a good living and laying up something for the proverbial rainy day. A peculiarity of the poultry business is that it lends to great enthusiasm and

It is very easy to acquire a great liking for it. Read such valuable books as this "Profitable Poultry." Subscribe for a few of the many poultry journals and you will readily succumb to an attack of the "chicken fever." It becomes very violent sometimes and we have seen persons who could not think or talk of anything but chickens. It shows that there is a great fascination for the work.

I wish to cite you one instance, although I could point out thousands of them. One right here in our own state, Mrs. D. C. Johnson, of Maxwell, Ia., left a widow at 24 years of age with three small children and practically no means of support; education limited and with no business knowledge, started in the chicken business and in a few years, by sheer force of grit, push and hard earned ability, learned the business, made a living, made money and in five years bought a 270-acre farm with a good payment down and in a few years later had it paid for.

Poultry Business Open to All

What would be the natural consequence of lessening the industrial and manufacturing business of the country? An overproduction of labor in all lines, which will lower the price and also throw many out of employment.

The poultry farmer is always sure of a good living; it will affect them much less than any other class. The farmers furnish the food for all classes, and as all must eat their products, which will always be in demand, perhaps not quite so high in hard times as in prosperous periods, but they will be the last to be affected. The farmers as a class have been making more money than any other.

The poultry raiser is strictly in it at all times; the supply is never too great.

The United States never produces enough eggs for the demand and imports great quantities from Canada every year. So there is no danger of overdoing the poultry business, especially in the production of eggs.

There is no business that affords greater opportunities to all classes than that of the poultry business. Take the great West, for instance, where many places in the new states and territories, eggs sell for from 30 to 60 cents per dozen. There is no business that can be started with so little capital as that of poultry, and it is open to all.

It is a business that is easily learned and readily picked up by any one with common intelligence. It does not require long apprenticeship or years of study. Just go at it and not too fast at first, and you cannot help but succeed.

There are opportunities for raising poultry everywhere; better near a town or city where a good steady market can be had for good poultry and fresh eggs. Young men just starting out in business, investigate this great enterprise. Small or unsuccessful farmer, look into this matter. Discouraged tradesman and laid off workman, it will pay you to investigate the great possibilities of the poultry business. It will put new life in you—new hope, and make life a thing of joy and happiness. It is open to all classes and conditions of people everywhere.

Poultry Business for Physically Disabled People

On account of the poultry business being light work it is especially adapted to persons that are physically unable to do hard manual labor or perform hard, strenuous mental strains as the active business man is forced to do.

I do not want to lead you to think that the poultry business is all play and requires little or no work with hands or brain, but will say that it requires very close watching of small details and constant work—not hard work but constant light duties that because of their interest and fascination become a pleasure and the change usually has a very beneficial effect upon most people that are broken down in health and take up the chicken business.

And especially it is a beneficial change for those suffering mental disability, nervousness and the change of life of women, as the chicken business is highly fascinating, so much so that the "Chicken Fever" is very easy to catch and is one of the best things a person can have. It is good for health, pleasure, and profit; you forget your ailments in the fascination of the work.

Insect Pests Create Annoyance With Fowls

Insect Pests

Two classes of external parasites, popularly known as lice and mites, will be considered here. There are several varieties of lice which attack poultry. The sub-

sist mainly on the feathers and perhaps on the epidermic scales. They are found largely on the head and neck, under the wings and about the vent, and when present in large numbers they cause the fowls much discomfort. Persian insect powder (pyrethrum), powdered sulphur, and some of the various preparations on the market, such as the louse powders, are good in combating these pests.

The hens can be dusted with one of these powders after they have gone to roost. Have the powder in a box with a perforated cover, grasp the fowl by the legs and shake the powder well among the feathers.

Dust at least three times at intervals of about a week in order to catch the lice which hatch out after the first dusting.

The mites subsist on the blood of the fowls and are not usually found on the bodies of the bird except when at roost or on the nest. During the day they inhabit the cracks and crevices of the walls, roosts and nests.

Setting hens are often so annoyed that they are compelled to leave the nests in order to relieve themselves of these parasites.

The free use of kerosene about the nests and perches is useful in fighting mites. The walls of the house may be sprayed with kerosene, the operation being repeated every three or four days for two weeks.

Insect powders are of little avail. The following method has proved excellent in ridding houses of mites and lice when the weather conditions are such as to permit the birds being kept out-

side the house for five or six hours:

Close all the doors and windows and see that there are no cracks or any other openings to admit

Get an iron vessel and set it on the gravel or sand near the center of the house; place in the vessel a handful of shavings or straw saturated with kerosene, and on these sprinkle sulphur at the rate of about one pound to every 50 or 100 square feet of floor space. Instead of using the shavings and kerosene the sulphur can be saturated with wood alcohol. When everything else is in readiness light the material and hastily leave the house. In case any anxiety is felt about fire, a glance through a window will show whether everything is all right.

There is very little danger of fire when proper precautions have been taken to have plenty of soil beneath the vessel.

Allow the house to remain closed for three or four hours, at the end of which time one can safely conclude that there are no living beings inside.

Now throw all the doors and windows wide open so as to drive out the sulphur fumes thoroughly, and then the fowls may be allowed to enter. Let them in one by one, and as each enters catch it and dust it well with insect powder, which will destroy the lice on the birds.

Tobacco dust is also good to use instead of insect powder. The birds and house have now been freed from vermin for the present, but the eggs of the insects have not been destroyed, and in a week another swarm will be hatched out. Therefore it will be necessary to repeat the operation once or twice before the pests are exterminated. After this care should be used to see that no strange fowl is admitted to the house or yard without having been thoroughly rid of lice, for one

lousy hen will contaminate all the rest.

Intestinal worms.—Worms are frequently present in the intestines and ceca of chickens, particularly young chicks, often causing considerable loss. Practically the only way to determine that worms are present is to examine the ceca and intestines of dead chicks. The worms are small and hairlike. Occasionally flat tape worms are found, but these are not very common. Chicks infested with worms go off feed and become thin and sickly looking.

In combating worms care should be taken to keep clean the soil over which the chicks run, and to move the runs each year or two if possible. Cleanliness in the house must also be observed. In treating affected birds, powdered areca nut (20 or 40 grains per fowl), administered either in mash or mixed with butter and made into pills, is an effective remedy. Powdered male fern (30 grains to 1 dram), or oil of turpentine (1 to 3 teaspoonfuls), alone or diluted, with an equal bulk of olive oil, is also very good. It is well to follow any of these remedies with a dose of castor oil (1 to 3 teaspoonfuls.)

Mash Feeding

It is the practice of a large percentage of the most successful poultrymen to feed a part of the daily grain ration ground. Most of them feed the ground grain moistened with either milk or water, although some feed it dry. A fowl's gizzard is capable of grinding all kinds of grain, but it is generally considered to be more economical to have a part of the grinding done by steam or water power. The soft-feed idea, however, must not be overworked. A beginner often reasons that it is cheaper for the miller than for the fowl to grind the grain;

Observe Quietude Among Fowls

but the powerful muscles of the gizzard are there to be used, and experience has shown that the balance of power of functions in the fowl's economy makes the vigorous exercise of the gizzard beneficial. When feeding moistened ground feed have it a comparatively dry, crumbly mash, and not a thin slop. Give what they will eat readily in 15 to 20 minutes.

Marketing

Marketing poultry and poultry products.—A large part of the profit in poultry keeping often depends on the marketing of the products, and the producer should study the market demands as to how, where, and when to dispose of the products to the best advantage.

An attractive appearance is of prime importance, and the producer should study the details of killing, dressing, and packing in order to arrange the products in the best possible manner.

The requirements for dressing and packing vary somewhat in different markets, and the producer should learn any special requirements of the market to which he intends shipping.

MILK

When properly fed, milk makes an excellent feed for poultry. In feeding sour milk or buttermilk, however, the feeder must exercise care not to give too much or bowel trouble will likely result. Skimmed milk is an economical feed. In skimming, the most valuable food constituents—the nitrogenous substances—are left in the skimmed milk. Not only does this skimmed milk contain much nutritive material, but it contains it in a form which, as a rule, is easily digested.

Skimmed milk may often be advantageously substituted in part for meat. Milk may be used in mixing the soft feed, or it may be given the fowls to drink in addition to water.

Molting

Molting.—Where a specialty is made of producing winter eggs, it is important that the hens shed their feathers early, so that the new plumage will be grown before cold weather begins. Henry Van Dresser has proposed a way by which it is possible to cause a flock of fowls to pass through the molting period early and uniformly. This method consists in withholding part of the feed for about two weeks, which stops egg production and reduces the weight of the fowls, and then feeding heavily on a ration suitable for the formation of the feathers and the general building up of the system. This method was tried at the West Virginia Experiment Station with good results. The hens molted more rapidly and with more uniformity, entering winter in bet-

ter condition than similar fowls fed continually during the molting period on an egg-producing ration. Whether this method is employed or not, the fowls should receive a more nitrogenous ration than the one ordinarily fed. The addition of a little linseed meal during the molting period will aid in the production of a new coat of feathers. An increase in the amount of animal feed will also be beneficial.

Soft Shelled Eggs

The cause may be either too much fatness, diseased egg-producing organs, or lack of shell making material. If the first be the cause, the remedy would be to reduce the fatness by giving less food or food of a less fattening character, with plenty of exercise; if the second, little can be done; though a promotion of the general health through plenty of exercise, fresh air and correct feeding might restore the diseased organs to a normal condition; if the third, the providing of plenty of good sharp grit and an abundance of ground oyster shells would doubtless be sufficient to cause the hen to lay eggs with proper shells.

Hens will occasionally lay one or two soft-shelled eggs when they appear to be in good laying condition and properly fed, while the rest of their product will be normal. In such cases there is no occasion for alarm. But if the practice continues one should promptly set to work to ascertain the cause and provide appropriate remedy.

Sprouted Oats

Oats can be sprouted in shallow wooden boxes, with sides, about 3 in. to 5 in. deep, such as used by nurserymen for seedlings, the chief factors for the growth being sufficient but not too much moisture, together with light and warmth. In summer there is no difficulty about the latter points, but in winter either a greenhouse, corner of the kitchen, scullery, or warm outhouse are necessary for obtaining sufficient heat for rapid sprouting.

The oats should be spread thickly over the bottom of the box, and at first watered freely so that they become thoroughly soaked, and as sprouting progresses see that just sufficient moisture is supplied to keep them growing, but not to rot the roots.

A little experience will soon tell the amount of oats which yield the best results. To keep up continuity of supply a fresh planting should be made about every three days and the sprouted oats fed to the chickens or fowls when they are from 4 in. to 6 in. high. A rod of these cut out are a rare treat to poultry when other green food is scarce.

If preferred, the oats, before spreading in boxes can be thoroughly soaked in a tub of water, and this where they are kept within doors will do away with the attendant mess of at first watering the boxes freely.

Taming Fowls

Fowls to produce well must be kept tame. At feeding time, when the birds are hungry, and you have from one to five minutes time that can be spared, sit or kneel down at the usual feeding place with the bucket of feed and throw out a little of the feed near you, gradually shortening the distance from day to day. In this way the birds may be made to approach rather close and after a few trials they will usually eat from one's hand.

Gentleness at all times must be observed if good results are to be obtained. Laying fowls, like bees, sting when disturbed by quick motions or otherwise, the only difference being that the sting is in the pocketbook.

Avoid hasty passing by windows or openings of poultry houses and do not enter suddenly. Sometimes it is well to rap on the door to draw the bird's attention, so that they will not be taken by surprise and pile into a corner or try to get out by way of the roof.

When walking among the birds, do so with a slow, deliberate step. It is also a good practice to call the birds to their feed with a low whistle and to use this same whistle when entering the pen, or when the birds are disturbed in any way.

Telling the sex.—In some breeds, especially the American and Asiatic varieties, it is often difficult to tell the sex of the young stock, particularly when of the age of three or four months. Usually the head is broader and the tail more stumpy in males than in females. But this rule does not always hold good, as pullets quite frequently have the outward markings of cockerels.

When all other signs fail, the expert distinguishes the sex by the sound of the voice of the chicken when caught—that of the male being coarser and more harsh than that of the female.

Ventilation

Ventilation.—The ventilation of a poultry house is very important. A house with tight walls, roof and floor and an open front, will contain cold, dry and pure air, three essentials for the health of the fowls in winter. With such a construction there will be no draughts but plenty of fresh air.

Size of poultry house.—In determining the size of a house, consider the number of fowls that are to be kept in one pen. As a rule, fowls are too crowded for economical production.

A flock of fifty hens should usually be allowed about five square feet of floor space per hen. When the attendant is careful to keep the house clean and the floor heavily littered with straw, less floor space will be necessary. As a rule, it is far better to allow too much floor space rather than too little. The larger the pen, the less floor space will be required per hen. One hundred hens will thrive in a pen 20x20 feet, that is, four square feet of floor space per hen, but one hen will not thrive in a pen 2x2 feet. In a large pen, each one has a chance to wander about over the entire floor space, thus getting more exercise.

**FOR LAWNS
FOR MEADOWS**

GRASSES

**FOR PASTURES
FOR HAY**

Grass That Will Survive in Shade and Steep Side Hills

Amount Required Per Acre. Adapted to Various Locations. Average Price Which May Vary in Different Seasons in Different Regions.

Canada Blue. Has a flatter and a more wiry stem than the Kentucky grass, also bluer color. Used in the cheap mixtures as a substitute. Useful throughout the East and North, including Canada, on dry sand or clay. Seed weighs 14 pounds per bushel. Takes 3 bushels per acre. Worth \$25 per 100 pounds.

Creeping Bent. Forms strong turf; grows rapidly, improved by heavy rolling. Favorable for low-lying inland and dry valleys of the Eastern States. Sow three bushels to the acre. Price \$40 per 100 pounds.

Crested Dog's Tail. Valuable for shady places, and under trees. Also for terraces on deep soil. Has the same color of Kentucky blue grass. Mixes well with that and is a good bottom grass, but not recommended alone. Prefers rich, moist soil. Is among the best lawn grasses which require close cutting and an ability to resist trampling, as in golf links, croquet lawns, tennis courts, etc. Takes one bushel of 30 pounds per acre. Worth \$40 per 100 pounds.

English Rye. Makes good verdure in four weeks. Dies out in two or three years. Valuable for quick effects in the Middle and Eastern States. Requires 2 bushels to the acre. Worth \$9 per 100 pounds. Weight of bushel is 28 pounds.

Italian Rye. Very rapid grower and valuable for short, quick effects. Is practically an annual. Use very thickly in mixture, as far South as Jacksonville, Florida. Seed weighs 22 pounds per bushel. Worth \$9.50 per 100 pounds.

Kentucky Blue Grass. Starts early, lasts till frost, fine texture, rich green color, smooth even growth. Three years to establish. Dislikes some soils. Seed weighs 14 pounds to the bushel. Takes 3 bushels to the acre. Worth \$35 per 100 pounds.

Red Top. Stands hot weather and rough usage. Adapted to regions north of Tennessee. Fills in well with blue grass. Takes from 4 to 6 bushels per acre. Worth \$28 per 100 pounds.

Rhode Island Bent, favorable to use on sandy meadows. Makes a close, fine turf in color, very green. Price per 100 pounds \$40.

Sheep's Fescue. Useful in mixtures for the Northwest and for lands on poorest sands. This is a "bunch" or "stool grass" with very fine foliage and dense dwarf growth for any uplands. Seed weighs 18 pounds to the bushel and takes 2 bushels to the acre. Worth \$30 per 100 pounds.

Slender Fescue. Has a finer leaf than Sheep's Fescue and stools like that. Recommended only in special situations. Dry slopes, on lawns, or on dry, high situations. Takes 1½ bushels per acre, weighs 22 pounds per bushel. Worth \$40 per 100 pounds.

Wood Meadow. Very hardy and early, resisting heat. Best grass for very shady places in woodland parks. Takes 1½ bushels per acre. Weighs 19 pounds per bushel and is worth \$50.00 per 100 pounds.

Best Farm Grasses for All Purposes

Weight per bushel. Amount required per acre. Where necessary to use. Price of seed liable to vary according to season and locality.

Brome Grass. Suitable for upland soils in the Northwest. Makes good hay first two years. Seed weighs 14 pounds to the bushel. Requires 20 pounds per acre. Makes good pasturage. Seed worth \$18 per 100 pounds.

Canada Blue Grass. Makes good hay on Northern sandy soils. Leaves a coarse stubble. Requires 42 pounds seed to the acre. Weighs 14 pounds to the bushel and costs but 15 cents a pound in lots of 100 pounds. Look up price in feed stores. It is worth probably more.

Crested Dog's Tail. Good for hard dry soils and sheep pastures. Seed weighs 21 pounds per bushel. Takes 50 pounds per acre. Costs 50 cents per bushel for 100 pounds.

English Rye Grass. Well liked by stock. Highly prized for hay in Europe. Seed weighs 23 pounds per bushel. Takes 50 pounds per acre. Costs 9 cents a pound per 100 pounds.

Foxtail Millet. Makes good hay. Suitable for soiling; common type is earliest. Hungarian medium, German, latest and best yielder. Seed weighs 50 pounds per bushel. Use 12½ pounds per acre.

Italian Rye Grass. Useful, self-seeding, annual, but little known in the East. Requires 50 pounds seed to the acre. Weighs 20 pounds per bushel. Makes excellent hay. Seed costs \$1.20 per 100 pounds.

Japanese Millet. An annual suitable for hay in the South and West, on wet soils. Requires 15 pounds per acre. Costs 7 cents per pound, per hundred pounds. Price varying, of course, in different

Kentucky Blue Grass. Standard pasture for humid U. S. and limestone soils. Seed weighs 14 pounds per bushel. Acre requires 40 pounds seed, costing 18 cents a pound per 100 pounds.

Meadow Foxtail. Sow early on moist soil 7 pounds to the acre. Mixed with other grasses. It is not usually sown alone as it does not reach maturity till the second or third year. Weighs 32 pounds to the bushel. Is suitable for either hay or pasturage. Requires 25 pounds per acre. Price \$40 per 100 pounds.

Orchard Grass. A hardy grass, which is best when cut young. Good in mixtures. Requires 40 pounds to the acre. Seed weighs 18 pounds to the bushel and costs 22 cents a pound per 100 pounds.

Redtop, Burdens Grass. Suitable for pasture on soils too wet for timothy. Requires 32 pounds per acre if used alone, or 15 pounds as a mixture. Weighs 32 pounds to the bushel. Costs \$18 per 100 pounds.

Timothy, Herd's Grass. Makes the standard hay in the North Atlantic States. Takes 35 pounds seed to the acre. Weighs 45 pounds to the bushel. Costs 9 cents per pound, per 100 pounds, according to the price given in "Garden and Farm Almanac." The price is much higher probably, as will be learned at the seed stores.

Wood Meadow Grass. Good for moist shady soils. Better for lawn than field use. Requires 28 pounds seed to the acre. Weighs 14 pounds to the bushel and costs 50 cents per pound in 100 pound quantities.

The Clover Grasses

Clover, Alfalfa or Lucerne. Adapted to use of cattle, horses and hogs. Adapted to hay and pasture, perennial. (See elsewhere for description of Alfalfa.)

Clover. Red; adapted to all live stock; plowed under makes the best green manure known

Clover. Alsike grows 2 to 3 feet tall. Can have 2 to 4 cuttings per year; adapted to Northern and Middle States, requires a good clay loam; takes from 5 to 7 pounds seed to the acre.

Clover. White; a perennial, fine for pasturing and makes the best plant known for bees.

DOGS, IN EUROPE AND AMERICA.

DIFFERENT BREEDS.



Bloodhound,
Hounds, Mastiff, Newfoundland,
Collie, and St. Bernard

DOGS;

Including Retriever, Pointer, Setter,
and other Dogs.



Collie Dog.

The Collie, an English sheep dog, origin unknown, is highly intelligent through many generations of special training.



English Mastiff.

The English Mastiff has descended far away back, according to some authorities, from a bull dog ancestry.



Bloodhound.

The Bloodhound receives its name from certainty with which he follows any animal after smelling of its blood.



English Fox-Hound.

The English Fox-Hound, a smooth, handsome dog, has extremely keen scent, great speed and strength of wind.



Deer Hound.

The Deer Hound, a native of Scotland, large, graceful, formerly of great service in hunting deer.



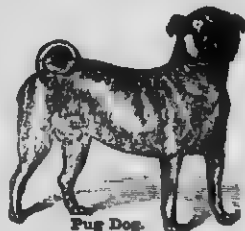
Smooth St. Bernard Dog.

The Smooth St. Bernard exhibits great energy and sagacity. There are two species, rough and smooth coated.



Newfoundland Dog.

The Newfoundland is a native of the Isle of that name. Large, black, and of docile disposition.



Pug Dog.

The Pug is of uncertain origin, but the pure breeds have always stood high among dog fanciers.



Rough St. Bernard Dog.

The Rough St. Bernard has wide reputation as savior of lost travelers on the Swiss Alps.



Pomeranian Dog.

The Pomeranian, or Spitz dog, is an importation from Pomerania, in Russia, and now bred in America.



Bassett Hound.

The Bassett Hound, originally from France, long ears, smooth coated, short legs, waddling gait, hair glossy.



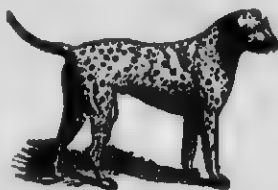
Dachshund.

The Dachshund, or German Badger Dog, originated in Central Europe. Has long body and short, crooked legs.



Maltese Dog.

The Maltese Dog has long silky hair, slightly wavy but not curly.



Dalmatian Dog.

The Dalmatian, a Spotted Dog, is a native of Delmatia, in Austria. An excellent coach dog.



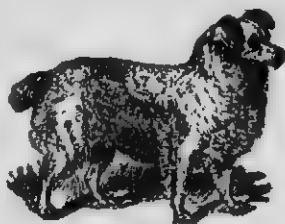
Harrier Dog.

The Harrier, an English dog, somewhat resembling the Fox Hound, his principal vocation being to hunt hares.



Italian Greyhound.

The Italian Greyhound is a delicate, small dog, valued principally as a drawing-room pet.



Truffle Dog.

The Truffle Dog is an English breed, cultivated originally to find and dig a vegetable known as Truffle.



Greyhound.

The Greyhound, is formed on the principle of the thoroughbred race horse, slender legs, quick action.



Chinese Crested Dog.

The Chinese Crested Dog, China, has no hair on body and resembles the Greyhound in form.



Bulldog.

The Bulldog originated in England several centuries ago when bullbaiting was one of the popular amusements.



The Otter Hound, an English sporting dog, of service in protecting fish ponds from depredation by otters.



Poodle Dog.

The Poodle was originally a Water Spaniel in the lowlands of Europe. Draining the land changed its nature.



Wavy-Coated Retriever.

The Wavy-Coated Retriever is supposed to be a cross between the small Newfoundland and the Setter.



Black Wavy-Coated Retriever.

The Black Coated Retriever, extensively bred in England, is a union of the small Newfoundland and water spaniel.



Pointer Dog.

The Pointer, an English hunting dog. Two breeds, two colors, liver and white, lemon and white.



English Setter Dog.

The English Setter, a superior hunting breed, dates back to 1780, but has been greatly improved since 1825.



King Charles Spaniel.

The King Charles Spaniel derives its name from Charles II, England. Intelligent and pleasant in disposition.



Blenheim Spaniel.

The Blenheim Spaniel receives the name from the Marlborough family of England. In form resembles the King Charles.



Beagle Dog.

The Beagle, English hunting dog, is kept in packs by Englishmen for hunting rabbits and hares.



Irish Water Spaniel.

The Irish Water Spaniel, native of Ireland, learns easily, is plucky, companionable, obedient and highly intelligent.



Clumber Spaniel.

The Clumber Spaniel takes his name from the home of the Duke of New Castle, in Nottinghamshire, England.



Scotch Terrier.

The Scotch Terrier, small, rough dog, native of Scotland. Courageous, docile and valuable as a vermin hunter.



Sussex Spaniel.

The Sussex Spaniel, English, dates back to 1772 and belongs to the same family as the Clumber.



Cocker Spaniel.

The Cocker Spaniel is an English species, popular because active, faithful and enthusiastic in the hunting field.



Frick-Ear Skye Terrier.

The Frick-Ear Skye Terrier is a variety of the native dog of the Isle of Skye, Scotland.



Drop-Ear Skye Terrier.

The Drop-Ear Skye Terrier is the name of the old English Yorkshire Terrier. Superior for rats and rabbits.



Bull Terrier.

The Bull-Terrier, a handsome, symmetrical dog, active and vivacious, is a compound of Terrier and Hound.



White English Terrier.

The White English Terrier differs from the black and tan only in color. Is affectionate, lively and tractable.



Black-and-Tan Terrier.

The Black-and-Tan Terrier, English bred originally, has keen scent for hunting and destroying rats.



Airedale Terrier.

This is a truly sporting breed of English origin and highly popular in America. Philadelphia is quite a stronghold of this breed.



Irish Terrier.

The Irish Terrier, native of Ireland, is a fine sporting dog, active, companionable and a good house dog.



Bedlington Terrier.

The Bedlington Terrier, dating back to 1823, comes from Bedlington, England. Weighs from 16 to 25 pounds.



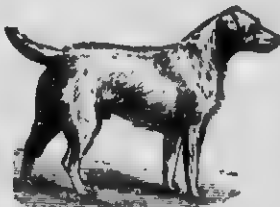
Yorkshire Terrier.

The Yorkshire Terrier, named from Yorkshire, England, where it originated. It is a parlor pet with long silky hair.



Smooth Fox-Terrier.

The Smooth Fox-Terrier is the outgrowth of old time Terriers used in hunting foxes in England.



Rough Fox-Terrier.

The Rough Fox-Terrier, an irregular breed, and so named in opposition to the Smooth Fox Terrier.



Dandie Dinmont Terrier.

The Dandie Dinmont Terrier, a Scotch dog, is supposed to be a cross with the German Dachshund.

DOMESTIC PETS, INCLUDING PIGEONS, SWAN, GUINEA FOWL, PARROT, AND CATS.



The Pea-Fowl



Guinea-Fowl.

The Guinea Fowl is found wild in Africa.



Guinea-Pig.

The Guinea-Pig is a native of South America and esteemed for beauty and gentle disposition.

The Pea-Fowl, native of India, belongs to the Pheasant family.



Angora Cat.

The Angora Cat, English, belongs to the long-haired



Persian Cat.



Leghorn Hunt Pigeon.

The Leghorn Hunt is said to have originated on the shores of the Mediterranean.



Gray (Talking) Parrot.

The Gray Parrot is a cage pet, found on the western coast of Africa, whence it is imported. Remarkable as a good talker and for its longevity.



English Pointer dog.

The English Pointer, remarkable for swelling its crop



Lop-Eared Rabbit.

The Lop-Eared Rabbit is the most remarkable of its species, possessing very bright colors and ears measuring from 22 to 23 inches long.



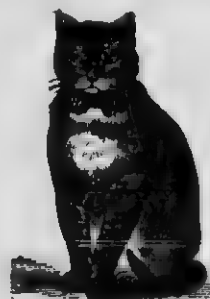
The Swan.

The Swan belongs to the duck family.



Silver-Gray Rabbit.

The Silver-Gray Rabbit ranks next to the lop-eared in value. Imported into England from other countries.



Brown Tabby Cat.

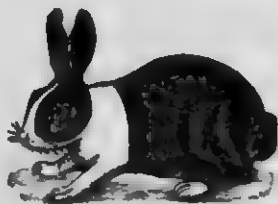
The Brown Tabby is a favorite domestic animal.

DOMESTIC PETS, COMPRISING VARIOUS KINDS OF RABBITS AND PIGEONS.



Himalayan Rabbit.

The Himalayan Rabbit is silver-gray in color, but whether originated in Himalaya is not known.



Dutch Rabbit.

The Dutch Rabbit, laying claim to great beauty, has been cultivated for many years in France.



Angora Rabbit.

The Angora Rabbit takes its name from its resemblance to the Angora goat in having long hair.



Trumpeter Pigeon.

The Trumpeter Pigeon, which is quite common in Europe, derives its name from the peculiar sound of its voice.



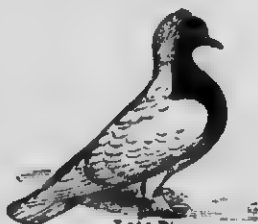
Belgian Hare Rabbit.

The Belgian Hare, a native of Belgium and adjacent countries, was originally imported into England for food.



Nun Pigeon.

The Nun Pigeon, from its marked contrasts in colors, has always held high place among fancy pigeons.



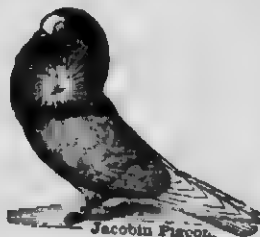
Latz Pigeon.

The Latz Pigeon is so-called from the appearance of a latz bodies in color, covering its form.



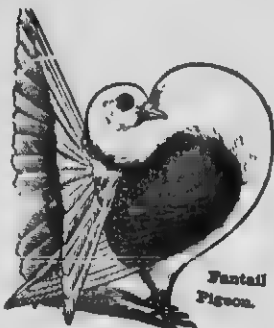
The Pheasant.

The Pheasant, an ornamental bird, cultivated for its beauty, is a prolific layer and good mother.



Jacobin Pigeon.

The Jacobin, so named because feathers in the back of its head resemble the head of a monk.



Fantail Pigeon.

The Fantail has been cultivated in India for 200 years.



Almond Tumbler.

The Tumbler receives its name from its natural propensity to turning over in its flight.



English Carrier Pigeon.

The English Carrier, king of pigeons, said to have originally come from Persia.

**PROFITABLE
PLEASANT INDUSTRY**

BEE KEEPING

**REQUIRES CARE
AND ATTENTION**

Full Particulars as to How to Conduct the Business

Apiculture, or bee-keeping, is one of the oldest of all human industries. In the earliest ages the honey of the wild bee was highly esteemed as food. A land "flowing with milk and honey" was regarded as an earthly paradise. Treatises on the bee and its management were written long before the Christian era, and all down the centuries many men have been occupied with profit in bee-keeping. Modern improvements in hives and in methods of management have reduced the business to a science, and with the introduction of foreign bees, especially the Italian bee, into the Dominion, bee culture is now fully recognized as a profitable industry.

It may be safely said that any place where farming, gardening, or fruit raising can be successfully followed is adapted to the profitable keeping of bees—in a limited way at least, if not extensively. Many of these localities will support extensive apiaries.

This pursuit may also be followed in or near towns and, to a limited extent, in large cities. It even happens in some instances that bees in cities or towns find more abundant pasturage than in country locations which are considered fair. Thus, bees thrive in the city of Washington on account of the excellent bee pasturage in the numerous gardens and parks and the nectar-yielding shade trees, including the linden or basswood, along the streets. A prosperous apiary has been kept on the roof of a business house in the heart of New York City, and other on the roof of a store in Cincinnati, and similar experiments in other cities have given satisfactory results in yield of honey.

It is evident, therefore, that no one need be deterred by his locality from keeping bees, provided the nectar-yielding trees and plants of the range are of the right sort and abundant. Moreover, regions so rough and sterile or so swampy as to give no encouragement to the agriculturist, or even to the stock raiser, will often yield a good income to the bee-keeper, insignificant and apparently worthless herbs and shrubs furnishing forage for the bees.

The ability of the bees to range over areas inaccessible to other farm stock and to draw their sustenance from dense forests when the timber is of the right kind, and the freedom which, because of their nature, must be accorded them to pasture on whatever natural sources are within their range of 3 or 4 miles, must be taken into account in estimating the possibilities of a locality.

Profits of the Business

Bee-keeping is an occupation extremely fascinating to most people who have a taste for the study of nature, but the income to be derived from it when rightly followed is a consideration which generally has some weight, and is often the chief factor in leading one to undertake the care of bees. Of course, where large apiaries are planned, the prime object is the material profit, for they require much hard labor and great watchfulness.

Apiculture, like all other branches of agriculture, depends largely upon the natural resources of the location, and the special conditions of any particular season, no matter how skillful the management, may make great differences in the year's return. The knowledge, skill, industry, and promptness of the one who undertakes the care of the apiary have likewise much to do with the return. Furthermore, profits are of course largely affected by the nature and proximity of the markets.

A moderate estimate for a fairly good locality in an average season would be 35 to 40 pounds of extracted honey or 25 pounds of comb honey per hive or colony.

When two or more of the important honey-yielding plants are present in abundance and are fairly supplemented by minor miscellaneous honey plants the locality may be considered excellent, and an expectation of realization more than the yield mentioned above may be entertained.

With extracted honey of good quality at the wholesale price of 6 to 8 cents per pound and comb honey at 12 to 14 cents, each hive should under favorable circumstances give a gross annual return of \$2.50 to \$3. From this about one-third is to be deducted to cover expenses other than the item of labor. These will include the purchase

of comb foundation and sections, repairs, eventual replacing of hives and implements, and the interest on the capital invested.

By locating in some section particularly favorable to apiculture—that is, near large linden forests, with clover fields within range, supplemented by buckwheat; or in a section where alfalfa is raised for seed; where mesquite, California sage and wild buckwheat abound; where mangrove, palmettoes, and tili, or where sourwood, tulip-tree, and asters are plentiful—the net profits here indicated may be frequently doubled or trebled.

On the whole there should be expected from the raising of bees for any purpose whatever only fair pay for one's time, good interest on the money invested, and a sufficient margin to cover accidental losses, etc.

With no greater expectations than this and where intelligence directs the work, bee-keeping will be found in the long run, to rank among the best and safest of rural industries.

Bees Help Fruit Crops

The value of bees in the pollination, or fertilization, of various fruit and seed crops is often sufficient reason to warrant the keeping of a small apiary, even if circumstances are not favorable for large yields of honey or the saving of all swarms. The quality and quantity of many varieties of apples, pears, plums, and small fruits depends absolutely upon complete cross-pollination. The most active agents in this important work are honey-bees.

How to Avoid Stings

Almost anyone can, with perseverance and the exercise of due caution learn to manipulate bees with perfect freedom and without serious risk of being stung.

Stings can be avoided, first, by having gentle bees. If no other point of superiority over the common brown or black bee than that of gentleness could be fairly claimed for some of the races of bees introduced and some of the strains developed in recent years, it would still be worth while to get them on this account alone. When the fact of superiority in several other important points is considered also, there should be no further question as to the advisability of procuring them in preference to the common variety. The beginner is advised never to think of doing otherwise.

Of the races already in general cultivation, Carniolans are gentlest, although Caucasians, more recently introduced from southeastern Russia, are by far the least inclined to sting of any bees, and may be handled at all times without resorting to the protection of a bee veil, and generally without smoke or at most a very slight application of smoke. Some strains of Italians equal in gentleness average Carniolans, but in general the race native to Italy is by no means as gentle as that found in Carniola, Austria, and the Caucasians are much to be preferred for the beginner. In case these gentler races are not easily procurable he need not hesitate, however, to undertake, after adopting due precautions, the manipulation of pure Italians.

The second essential to enable one to avoid stings is to have a good "smoker" at hand whenever the bees are to be handled. Any way of getting smoke of any kind into the hive and about it may answer the purpose, but for ease and effectiveness in keeping bees under control nothing will take the place of the modern bellows smoker. A good one lasts for years, and its cost is slight.

A veil, made of black bobinet or Brussels net, to draw over the hat, and a pair of gloves, preferably of rubber, may be also used. Both veil and gloves can be safely dispensed with if the gentlest bees are kept.

The use of the "bee escape" in removing surplus honey reduces the risk of being stung during this operation. The useful device is fitted into a slot made in a board the same size as the top of the hive, and the whole, when slipped in between the brood apartment and an upper story or super, will permit all of the workers above to go down into the lower story but not to return to the top one, so that in one night it is possible to free entirely a

Difference in Temper of Bees

set of combs from bees without any manipulation of the combs, and without smoking, shaking, or brushing the bees.

Reasonable care in handling and attention to the above points will reduce the risk of stings to a minimum.

Different Races of Bees

The following are the principal races of bees now found in this country:

1. Caucasians, a gentle race of good workers, natives of Southern Russia.

2. Carniolans, larger-bodied than the Caucasians, good honey gatherers, introduced from Austria.

3. Italians, the first of the foreign races introduced into this country, industrious, handsome, and excellent honey producers.

4. Cyprians, from the island of Cyprus, small-bodied with great wing power, prolific, and the best of honey gatherers, but difficult in management.

5. German, common black, or brown bees, commonly found wild and cultivated to a greater or less extent, in this country; probably derived from early introductions from the Old World. In comparison with the races mentioned above, they may be said to be inferior, since they possess the least energy in honey collecting, are less prolific, and not as good defenders of their hives. Under favorable conditions, however, as regards pasturage they may be relied upon for excellent results. They are, however, aptitudinal under manipulation, and have the disagreeable habit of running from the combs and dropping in bunches on the ground, likewise of flying from the hive entrance and attacking passers-by.

Crosses are frequently made of black bees with Italian queens, or of the other varieties mentioned, and generally with good results.

What Hive to Adopt

Bee-keepers are agreed that the best hives must have movable frames on which the comb is made, and which may be lifted out at pleasure. This is called the Langstroth principle, from the name of the first maker of such a hive.

The suspended Langstroth frame is used more than any other frame among English-speaking bee-keepers. It is safe to say that in the United States 500 hives are made and used which are essentially Langstroth in principle to one frame hive of any other kind whatever.

The success of American bee culture in the last twenty-five years was first attributed by European bee-keepers to the honey-producing power of the country; but the most intelligent apiarists who have tried the American methods with the Langstroth hive now recognize that success is principally due to the manipulations that it permits.

There being no patent on the Langstroth hive, and accurately made hives being obtainable at moderate prices from hive factories in various parts of the country, it is taken for granted that the enterprising beginner will adopt a simple form embodying this principle—the loose-fitting, suspended comb frame—as its main feature.

The hive should not only be substantially built, but should have accurate bee-spaces and a close-fitting, rain-proof cover or roof. Factory-made hives, as a rule, best meet these requirements, as both lock joints and halved corners can only be made to advantage by machinery, and the expert hive builder understands, of course, the absolute necessity of great accuracy in bee-spaces, as well as the great desirability of good material and workmanship. Provision should also be made for winter protection.

For comb honey, hives permitting the insertion in the brood apartment of any number of frames up to eight, or frequently up to ten, are used to advantage, as the strength of the colony or of a given harvest may require.

Location of Stands

The stands for hives should be placed in an enclosure where the bees will not be disturbed by passing animals or by strangers, and where they may be kept quiet. The hives should be placed on separate stands at least three feet apart. Weeds should not be permitted to grow near them, and in no case should the stands be placed close to walls or fences, where manipulation of the hives would be rendered difficult.

Natural Swarming

Swarming is simply the migration of honey-bees to a new hive or home under the leadership of a queen.

During the swarming season, which comes in the warm days of summer, the bee-keeper must be on the alert. When the swarm is seen issuing from the hive, or in the air, after an unusual excitement or buzzing in the hive, the utmost coolness and care are demanded of the operator. The old method of rushing about beating tin pans, dinner gongs, and cowbells is no longer in vogue, having deservedly fallen into disrepute as a means of saving the swarm. In all the operations performed with bees the keeper must act gently and quietly.

Soon after he sights the swarm the bees will probably gather in a clump on a tree or bush near the apiary, and however formidable getting them into the hive may at first seem, nothing will be simpler than shaking them into their new hive, or into a basket or box, from which they may be poured in front of the hive, just as one would pour out a measure of wheat or beans. If any stick to the basket or box, invert it and give a sharp thump with one edge against the ground.

If the hive has been standing in the shade so that the boards composing it are not heated, and if it be now well shaded and plenty of ventilation be given above and below, the bees are almost certain to take possession at once and begin work actively.

The securing of swarms can be made, however, even simpler than this by having the colonies placed several feet apart on a smooth lawn or dooryard and clipping one wing of each laying queen so as to prevent her flying.

The prime or first swarm from each hive is accompanied by the old queen, and if she be clipped she will of course fall from the alighting board to the ground and may be secured in a cage. The bees will circle about a few times and return. Meanwhile the only thing for the attendant to do is to replace the parent colony by means of an empty hive. The returning bees will enter the latter and the queen may be allowed to go in with them, the cage being placed with its open end directly against the entrance to insure this. The swarm is thus made to hive itself.

The parent colony removed to a new stand a rod or more away will rarely give a second swarm. But to make certain all queen cells except one may be cut out four or five days after the issuance of the first swarm. At the same time one-third to one-half of the remaining bees of the removed colony may be shaken at the entrance of the hive containing the swarm.

This reduces the population of the parent colony greatly, but the loss is soon made good by the young workers emerging daily, and the new queen which will issue from the single queen-cell, spared when cutting out cells, will soon restock the hive.

Artificial Swarming

Where an increase in the number of colonies is desired, and in case no one can be near the apiary to care for natural swarms with clipped queens, one of several artificial methods of forming new colonies may be employed. Natural swarming is, however, preferable to a poor system of artificial increase.

Prevention of Swarming

Under the most frequent conditions, however,—that is, where it is not practicable for the bee-keeper to be present at all times during the swarming season, or where the desired number of colonies has been gained—it is desirable to manage so as to prevent as far as possible the issuance of swarms from the hive, without interfering with honey storing. There are many plans to prevent swarming.

The most commonly practiced and easily applied preventive measure is that of giving abundant room for storage of honey. This to be effective should be given early in the season, before the bees get fairly into the swarming notion, and the honey should be removed frequently, unless additional empty combs can be given in the case of colonies managed for extracted honey, while those storing in sections should be given additional supers before those already on are completed.

With colonies run for comb honey it is not so easy to keep down swarming as in those run for extracted honey and kept supplied with empty comb. Free ventilation and shading of the hives as soon as warm days come will also tend toward prevention. Opening the hives once or twice weekly and destroying all queen cells that have been commenced will check swarming for a time in many instances, and is a plan which seems very thorough and the most plausible of any to beginners.

The removal of a queen at the opening of a swarming season interferes, of course, with the plans of the bees, and they will then delay swarm-

How Obtain Surplus of Honey

ing until they get a young queen. Then, if the bee-keeper destroys all queen cells before the tenth day, swarming will again be checked. But this plan is not to be commended, as it interferes with brood rearing and honey storing.

Quite the opposite of this, and more efficacious in the prevention of swarming, is the practice of replacing the old queen early in the season with a young one of the same season's raising, produced, perhaps, in the South before it is possible to rear queens in the North. Such queens are not likely to swarm during the first season, and, as they are vigorous layers, the hive will be well populated at all times and thus ready for any harvest. This plan is called "requeening." It is conducive to the highest prosperity of the colonies and aids the securing of the largest average yield of honey.

Pasturage for Bees

Bees will fly a great distance for food, but should not be compelled to forage over a range greater than 2½ to 3 miles from the apiary. They should have access to an abundance of honey-producing plants. When selecting crops for planting, therefore, the bee-keeper should choose such as will furnish honey at the times when pasturage for his bees would otherwise be lacking.

Planting for honey alone would hardly be profitable in any case, but the intelligent bee-keeper will note his surrounding trees and plants carefully and see to it that his bees have an adequate supply of forage at all seasons. It must be remembered that the various plants and trees visited by bees produce honey only for a short time each year, often only for a single month. Hence, as complete a list as possible should be made of the plants and trees visited by honey-bees, and notes should be added as to period of blossoming, importance of yield, whether honey or pollen or both of these are collected, quality of the product, etc.

If gaps occur during which no natural forage abounds for the bees, some crop can usually be selected which will fill the interval, and, while supplying a continuous succession of honey-yielding blossoms for the bees, will give in addition a yield of fruit, grain, or forage from the same land.

Bees may, if necessary, be fed artificially and should always have access to pure water. Alfalfa, asparagus, basswood, buckwheat, locust, catalpa, chestnut, eucalypt, catnip, figwort, mignonette, mustard, rape, raspberry, roses, sainfoin, and sunflower are among the best honey-producing plants and trees.

To Obtain Surplus Honey

Good wintering, followed by careful construction of the natural warmth of the colony; the presence of a prolific queen—preferably a young one—with abundant stores for brood rearing and the prevention, so far as possible, of swarming, are the prime conditions necessary to bring a colony of bees to the chief honey floor in shape to enable it to take full advantage of the harvest.

In addition, it is only necessary to adjust the surplus honey receptacles in time, making the space given proportionate to the strength of the colony, and, while continuing to prevent as far as possible the issuance of swarms, to remove the accumulated honey fast enough to give abundant storage room.

Extracted Honey

To secure extracted honey, the requisite number of combs may be in one long hive, or in stories one above another. Preference is generally given to the latter plan. The brood apartment is made in this case to hold eight to twelve Langstroth frames, and a second, and sometimes a third or even a fourth story, may be added temporarily. These are often called supers.

Before removing the filled combs time should be allowed the bees to ripen and cap the honey; hence enough combs are necessary to give the bees storage room while they are capping others. The honey in combs that are quite or nearly sealed over may be considered sufficiently ripened to be removed from the hive.

The cells are uncapped by means of a sharp knife, made especially for this purpose, and the combs are then made to revolve rapidly in a machine called a honey extractor. The centrifugal force exerted on the honey throws it out, leaving the comb cells uninjured, or so slightly injured that they are wholly repaired within an hour or so after the return of the comb to the hive.

The chief advantages of this method of harvesting over that of crushing the comb are at once apparent when it is known that each pound of

comb saved represents several pounds of honey (consumed in its construction), and may with care be used over almost indefinitely in securing surplus honey. Furthermore, extracted honey is of much finer quality than that obtained by crushing the combs and straining out the liquid part, since it is free from crushed bees, larvae, pollen or "bee bread," etc., which not only render strained honey dark and strong in flavor, but also make it liable to fermentation and souring.

The extracted honey is run into open buckets or tanks and left, covered with cheese-cloth, to stand a week or so in a dry, warm room not frequented by ants. It should be skimmed each day until perfectly clear, and is then ready to be put into cans or barrels for marketing, or to be stored in a dry place.

Comb Honey

The main difference to be observed in preparing colonies for the production of comb honey, instead of extracted, is in the adjustment of the brood apartment at the time the supers are added. All the colony has been bred up to the greatest possible strength, the brood apartment should be so regulated in size, when the honey flow begins and the supers are added, as to crowd many of the bees out and into the supers placed above. The supers may hold from 24 to 48 sections. When the honey is designed for home use or for a local market, half-deep frames are sometimes used, the same as those often used above the brood nests when colonies are run for extracted honey, but for the general market pound sections are better adapted.

Comb foundation is now manufactured with extra thin septum or base and with the beginnings of the cells marked out by somewhat thicker walls which the bees immediately thin down, using the extra wax in deepening the cells. This is not artificial comb, but a thin sheet of wax having the bases of the cells outlined on it. Complete artificial combs have never been used in a commercial way, although there exists a widespread belief that they have been.

Production of Wax

No method has yet been found which will enable a bee-keeper, at the present relative prices of honey and wax, to turn the whole working force of the bees, or even the greater part of it, into the production of wax instead of honey; in fact, the small amount of wax produced incidentally in apiaries run for extracted or for section honey is usually turned into honey the following season; that is, it is made into comb foundation, which is then employed in the same hives to increase their yield of marketable honey. As each pound of wax represents several pounds of honey, all cappings removed when preparing combs for the extractor, scrapings and trimmings, and drone comb are to be rendered into wax. A practical machine for this purpose is known as the solar wax extractor.

The Wintering of Bees

How to bring bees successfully through the winter in the colder portions of the United States is a problem which gives anxiety to all who are about to attempt it for the first time in those sections, and even many who have kept bees for years still find it their greatest difficulty.

It may happen occasionally that a queen, apparently young and vigorous in the autumn, will die during the winter, when a young one cannot be reared, and as a result the colony will dwindle away. Such losses are, however, rare, and, aside from the possible results of fire, flood, or violent storms, are about the only ones which cannot be avoided by careful attention to right methods in wintering.

Insufficient or poor winter stores, hives faulty in construction, lack of protection from cold and dampness, too much or too little ventilation, too great a proportion of old bees or too great a proportion of young ones, overmanipulation late in the season, etc., are the most important and most easily detected causes of loss in wintering bees.

Indoor wintering should be confined to regions where there are several weeks, at least, of continued severe weather. When all conditions are right, consumption of honey will be less indoors and loss of bee life less than with the methods usually practiced in outdoor wintering.

Whatever method be followed in wintering, certain conditions regarding the colony itself are plainly essential: First, it should have a good queen; second, a fair-sized cluster of healthy bees, neither too old nor too young; third, a plentiful supply of good food.

Wide Opportunity for Bees to Gather Honey

The first of these conditions may be counted as fulfilled if the queen at the head of the colony is not more than two years old, is still active, and has always been at her colony position, yet a younger queen—of a one of the current season's rearing, and thus but a few weeks or months old—is, if raised under favorable conditions, much to be preferred.

The second point is not if brood rearing has been continued without serious interruption during the latter part of the summer and the cluster of bees occupies, on a cool day in autumn, six to eight or more spaces between the combs, or forms a compact cluster 8 or 10 inches in diameter. Young bees, if not well protected by older ones, succumb readily to the cold, while quite old bees die early in the spring, and others, which emerged late in the summer or autumn preceding, are needed to replace them.

The third essential—good food—is secured if the

hive is liberally supplied with well-ripened honey from any source whatever, or with a fairly thick sirup, made from white cane sugar, which was fed early enough to enable the bees to seal it over before they ceased flying.

The sirup is prepared by dissolving 3 pounds of granulated sugar in 1 quart of boiling water and adding to this 1 pound of pure extracted honey. Twenty to 25 pounds for outdoor wintering in the South, up to 30 to 40 pounds in the North, when wintering outside with but slight protection—or, if wintered indoors, about 20 pounds—may be considered a fair supply of winter food.

Special double-walled hives and other devices may be obtained to promote successful wintering. In fact, the manufacture of apparatus and supplies for bee culture is in itself an industry of considerable importance nowadays.



Bees in Open Field

Bee Keepers' Maxims

Clip the old queen's wings.
Go through the hives every ten days to destroy queen cells.

As the swarming season approaches have hives ready with foundation in brood-frames, and hive-stands ready to receive them.

Keep a serene spirit while hiving bees.

The hive in which the colony is placed should be kept cool and not heated from standing in the sun; it should be shaded, as the swarm will not enter a hot hive.

If the bees refuse to accept a hive, give them a frame of unsealed brood to reconcile them.

Maxims for Opening the Hive

Have the smoker ready to give forth a good volume of smoke.

Use the smoker to scare the bees rather than to punish them.

Do not stand in front of the hive lest the bees passing out and in take umbrage.

Be careful not to drop any implements with which you are working; take hold of all things firmly.

Move steadily, and not nervously.

Do not run if frightened, for the bees understand what running away means as well as you do.

If the bees attack you, move slowly away, smoking them off as you go.

If a bee annoys you by her threatening attitude for some time, kill her ruthlessly.

Ammonia applied to the wound

made by a bee-sting will usually afford immediate relief.

Keep the colonies strong.
The bees should be kept warm and well fed in the spring.

The bees must have wintered well.

The colony must have brood and plenty of honey in the brood-chambers at the beginning of the honey season.

Never let the honey in sections or supers be exposed in the apiary to incite robbery.

Keep the sections in a room in which the temperature never falls below 60 degrees.

Fumigate the sections before they are stored if you are troubled with bee-moth.

Send the honey to market in as attractive form as possible. Make your product individual in appearance, and strive to create for it a special market.

Maxims for Feeding

Keep close watch on the bees during the entire season, so as to know whether they need feeding or not.

Feed only good honey or the best sugar.

Never feed scorched sugar in the winter as it will surely kill the bees.

Observe the practice of feeding at nightfall to preclude robbing.

Never spill the sirup or honey around the yard, lest robbers be led on to black deeds.

Feed small amounts to stimulate a swarm or nucleus. Bees

are susceptible to small encouragements.

Be careful never to cool off the brood chamber when feeding in early spring or late fall.

See to it that the bees have water near by, especially early in the season.

Maxims for Wintering

Keep the colonies strong. Be sure that a good-sized swarm has at least thirty pounds of sealed stores.

Pollen should not be left in the comb for winter use.

Be sure that the honey is of good quality, and not made from decayed fruit or honey-dew.

Give the hive ventilation from below.

If wintered out of doors, give the bees a chance to fly.

If wintered in cellars, do not put too many bees in a cellar. If you have space for fifty colonies, do not try to winter more than thirty in it.

In cellars take off the bottom boards and arrange the hives so that the bees will get plenty of ventilation from below.

Have a thermometer in the cellar and keep watch on it. This should not show more than ten degrees of variation. If the temperature rises to 55 degrees, open the windows at night.

Keep the cellar dark and the air sweet.

Sweep the dead bees off the cellar floor several times during the winter.

**DIFFERENT
KINDS**

GRAINS

**SUCCESSFUL
CULTURE**

Wheat Growing

Wheat is the most valuable of all the cereal crops. Its original home is unknown, but it is probably a native of Western Asia. It was cultivated in the most ancient periods of the world's history. In China it was grown 2700 years before the Christian era, but it was probably not grown in America until after the discovery by Columbus in 1492. Today it is a most important crop in all the temperate parts of the globe, including vast areas of the United States and Canada.

Wheat is a hardy plant, though its cultivation does not extend as far north as that of barley, oats, or rye. It is an annual and may be sown either in the spring or in the fall. When sown in the fall it is known as winter wheat. Wheat grown in comparatively dry climates is superior in quality to that grown in humid regions, as is shown by the

soils. The most favorable soils are those which are permeable and deep, a little clayey and of medium fertility. Gravelly and sandy soils are not suitable. It grows well on alluvial soils and in fact on most soils which may be classed as heavy but which do not possess a very great tenacity.

Perfect drainage is essential, since young wheat plants are readily injured by the heaving of the soil due to the action of frost. Rolling the land before sowing winter wheat leaves the soil in a drier condition and thus minimizes the action of frost.

The preparation of the land for winter wheat consists in plowing the soil about 4 or 5 inches deep as early in the season as possible, to allow it to become somewhat compact before the seed is sown.

The seed is sown broadcast or in drills. When broadcasted, usually by a machine made for the pur-



In the Harvest Field of the Great Northwest

One Tractor Drawing Three Grain Binders, Cutting a Swath 21 Feet Wide. Each Binder 7 Feet Wide, Cutting 60 Acres in a Day of 10 Hours

difference in quality of the hard spring wheat of the Dakotas, for instance, and the soft winter wheats produced on the Pacific Coast. A prevalence of dry weather with bright sunshine from the time the plants begin to head until they are ripe is everywhere of the greatest importance.

The different varieties are classified by farmers as spring and winter wheats, bearded and beardless or bald varieties, soft and hard wheats, and also according to the color of the grain, as red, white, amber, etc. The varieties are very numerous, more so than in any other kind of grain. Botanists have classified the common bread wheats as *Triticum vulgare*, this species of *Triticum* including soft and hard winter wheats, hard spring wheats, white wheats, and early wheats.

Durum Wheat

The hardest-grained of all the wheats grown are popularly known as the durum or hard wheats. They are especially valuable for the manufacture of macaroni, but are frequently mixed with the bread wheats in the manufacture of flour and are largely grown in the United States.

Fertile Soil Required

Wheat requires a fertile and well-prepared soil. It makes a poor growth on light, humid, and acid

soils. It is harrowed in. Drilling, however, is the most popular method and has the advantage of evenly distributing the seed and covering it at a uniform depth.

Spring Wheat

Spring wheat is usually grown on fall-plowed land, and in the United States also frequently follows a corn crop without plowing the soil. It is generally sown as soon as the soil is capable of being worked in the spring. As wheat grows best and makes most of its growth during the cool part of the year, it should be sown as soon as conditions will permit. A moist soil at sowing time, provided it is not so moist that it cannot be worked, is the desirable condition.

Where wheat follows a corn crop (maize) without an intervening plowing of the soil, it is sown broadcast among the corn stalks and the field then cultivated with a corn cultivator and the surface smoothed down by repeated harrowings. Sometimes the corn stalks are cut into short pieces with a stalk-cutter before the seed is sown, which makes the cultivating and harrowing easier and more effective, but frequently the stalks are simply broken down by means of the harrow. If the stalks are not broken down flat to the ground, they cause trouble subsequently in cutting the grain by machine.

When Cut Wheat, Care Afterwards

Harvesting Wheat

Wheat is generally harvested before it has become dead ripe, in order to prevent the grain from shattering while being handled from the time it is cut until it is stacked or threshed. In California, however, this precaution is not so necessary and wheat is often left standing for a week or more after it is ripe enough to cut.

The time of harvesting wheat, like the time of sowing, varies with the latitude. In the United States the harvest begins in Texas early in May and it ends in some of the Northern States in August.

Harvesting wheat is usually done with the self-binder, although in regions where labor is cheap the reaper is still largely used.

After the grain has been bound into sheaves it is set up into shocks and left to dry and cure. Round shocks are made if the main object is to protect the sheaves against the rain but long shocks are required if the sheaves are wet or the grain is cut quite green. This expeditious drying and curing.

When the wheat has been cut and shocked, the sheaves are hauled and stacked until threshing time. The principal point to be observed in building a

stack is that the sheaves, especially the outer tier, must have an outward slant in order to shed the rain.

In this country threshing is generally completed in the fall. In sections where wheat is grown on an extensive scale, and the straw has little value, the grain is often harvested with headers, or machines which cut the grain just below the head. Some of these machines, with either horse or steam power, cut the heads and thresh out the grain at the same time.

At the present day, wheat is threshed with improved or perfected machines operated by horse, steam, or electric power. The old method of threshing by flail is now even less common than sowing by hand.

In this country wheat properly follows corn in the rotation of crops, since corn leaves the soil in clean condition. In the eastern states the use of commercial fertilizers in wheat growing is quite common, but in the west, as a rule, no fertilizers are applied. Barnyard manure is seldom applied directly to wheat, though it is usually applied to a preceding corn crop.

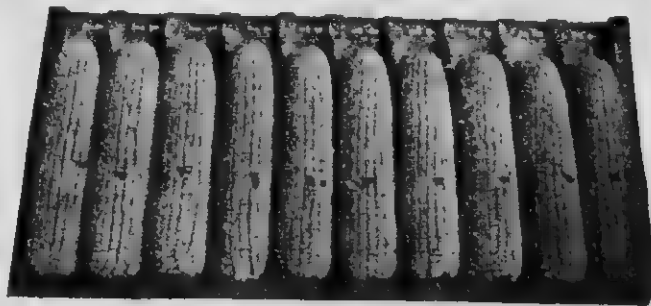
HOW TO FERTILIZE, PLANT AND CULTIVATE CORN

Maize or Indian corn (*Zea Mays*) is a universal crop in the United States under the popular name of corn. It is generally thought to be a native of America, all the evidence pointing to its cultivation by the native tribes long before the discovery by Columbus, who is said to have carried the first grains of corn to Europe on his first return voyage.

Most varieties have white or yellow kernels, but black, red, and various other colors are represented among the many different sorts. Ears vary in length from one inch in some varieties of popcorn to 15 inches or more in the so-called dent varieties. The plant varies in height from less than two feet in dwarf varieties to more than 30 feet in some forms grown in the West Indies. Specimens more than 20 feet tall are not uncommon in the rich river valleys of the United States.

plants should be cultivated with the horse-hoe or corn cultivator after they have attained sufficient height and until they are too large to admit of further cultivation without injury to the plants. In the principal corn-growing states cultivation usually begins about the first of June and lasts for about six weeks. When planted in drills it can be cultivated in one direction only. When grown in hills, or checks, the direction of each cultivation is at right angles to the preceding cultivation, so that all the surface soil may be stirred.

The time of harvesting corn depends somewhat on the use to be made of the crop. When grown for fodder, corn is cut when the kernels begin to glaze and the lower leaves begin to dry. The cut stalks are put up in shocks and left to cure in the field. When dry the ears are removed and the stalks,



Ten Champion Ears of Corn

Corn is grown on many different kinds of soil, but for its best growth requires a well-drained, rich, sandy loam which does not bake hard during drought.

In preparing the soil for corn, it is plowed deeper than for any other cereal crop, the object being to obtain a deep and well-pulverized seed-bed.

The bulk of the world's corn crop is produced in the northern Mississippi Valley, where it is planted from May 1 to May 20 and matures in about five months. In other latitudes planting is done late enough to escape the latest spring frosts.

Corn is usually sown in hills or in drills, by means of a corn-planter, but it is sometimes also sown broadcast. The hills should be about 3½ feet apart each way, and three or four stalks are produced to each hill; but when planted in drills the single plants are grown about one foot apart in the row.

From the time of planting until the young plants appear above ground, the soil is harrowed for the purpose of keeping the surface in a pulverized condition and preventing the growth of weeds. The

called fodder or stover, are used directly for feed, or shredded and then fed.

Corn grown for the grain is harvested when it is fully ripe and dry. The ears are gathered, husked, and stored in slat cribs, through which the air passes freely, thus drying the corn and preventing attacks of mold. This method of harvesting is known as husking, picking, or shucking—the first being the most common name.

Before it is fed or sold corn is usually shelled, by passing the huskless ears through corn-shellers operated by hand, horse, or steam power.

The great corn-producing states are Illinois, Iowa, Kansas, Nebraska, Missouri, and Indiana. About 50 bushels an acre is considered a good yield, but the average yield an acre for the whole United States is only about 25 bushels an acre. In individual instances yields of several hundred bushels an acre have been recorded and under more scientific cultivation the average yield an acre is on the increase.

Facts About Some of the Common Crops

Barley

Barley is one of the most ancient of cultivated plants. It has been found in the earliest Egyptian monuments. Its botanical name is *Hordeum vulgare* and the range of latitude in which it is grown practically equals the width of the temperate zones. The preparation of the soil for barley is very similar to that for wheat. The land should be plowed fairly deep and thoroughly pulverized to form a well-prepared seed-bed. The soil should be porous, well drained and fertile.

In northern latitudes barley grows best on sandy and calcareous loams, but in southern countries it thrives best on soils containing a little more clay. It is a plant of a short growing period and the tilth and fertility of the soil should be such as to enable it to make a rapid growth. When barnyard manure is applied directly to the crop it should be well rotted. It will be better to apply the manure to a previous crop, preferably corn.

In the United States barley is sown in the spring, as a rule, though it is also grown as a winter annual to some extent in the southern states. The quantity of seed sown varies from two to three bushels an acre. It germinates at about the same temperature as wheat, but the young plant is more susceptible to cold than wheat and a light frost will often injure it.

In the states where spring wheat is grown it is a common custom to sow barley after wheat and before oats are sown. It is generally sown broadcast, but many farmers, especially in the New England states, prefer to sow it in drills from 8 to 10 inches apart.

Barley is now generally harvested with the self-blinder. As soon as the sheaves are dry enough, they should be stacked or hauled into barns to prevent exposure to rains or damp weather, which will injure the color of the grain and materially reduce its market value. Barley ripens earlier than spring wheat and is usually harvested just before that crop. When grown for malting purposes it should not be harvested before it is thoroughly ripe.

From 35 to 40 bushels of barley an acre is considered a good yield, although under very favorable weather and soil conditions the yield often reaches 60 bushels an acre, or even more.

Oats

The oat (*Avena sativa*) is a hardy plant, well adapted to temperate climates and extensively grown for food and fodder in the United States. It succeeds best in a cool, moist climate.

Oats will grow on light, heavy soils, provided there is no excess of water. The seed-bed is prepared about the same as for wheat and barley, but not quite so deep. In the eastern states the land is usually plowed before oats are sown, but in the west they are frequently sown on corn land without plowing and covered with a corn cultivator or disk harrow, the surface being then smoothed with an ordinary harrow.

When sown on unplowed land oats are always broadcasted, and on plowed land may be either broadcasted or drilled. From two to three bushels of seed an acre is usually sown.

Oats are sown in the spring and in the fall, the latter in southern localities. The bulk of the crop is spring-sown.

When sown as early in the spring as possible the crop does best, as it makes most of its growth during the cooler part of the season. In northern latitudes it ripens in 90 days or even less, but in southern localities a longer time is required.

From 40 to 60 bushels an acre is considered a good yield, but much greater returns are often secured.

The oat plant furnishes green forage, hay, and straw, while the ripe grain and its milling products are of great importance as foods and feeding stuffs. The grain has long been used as a food for man, in the United States chiefly as a breakfast food.

Tobacco

The tobacco plant is a native of America and this continent has continued the principal producer and chief tobacco-growing country, the center of the tobacco interest in the United States being Virginia and Kentucky. Its name comes from Tobago, one of the West Indian Islands.

Tobacco owes its principal properties to the presence of a most poisonous alkaloid named nicotine.

In the cultivation of the tobacco plant the object is to render the leaves as large and numerous as

possible. When the leaves become brittle the plants are cut close to the ground, and afterward carried to the drying shed, where they are hung up in lines to sweat and dry.

When perfectly dry the leaves are stripped from the stalks and made into small bundles, which are subsequently stored in casks for exportation.

In the manufacture of tobacco the leaves are first thoroughly washed with salt and water. The midrib of the leaf is then removed, the leaves are again sorted and the large ones set apart for making cigars.

Cotton

This is a perennial shrub, consisting of two varieties, the long staple cotton, which has a fine, soft, silky fibre nearly two inches in length, and a short-staple cotton which has a fibre a little over one inch long adhering closely to the seed. The long-staple variety, known as Sea Island Cotton, holds the first place in the market. It is grown in some of the Southern states of America, especially on islands bordering the coast. The mode of planting is usually as follows: The seeds are sown in the spring in drills about a yard in width, the plant appearing above ground in about eight days afterwards. For the many improvements and methods of cultivation of cotton the reader is requested to address any of the agricultural experiment stations in the South which we publish elsewhere.

Hay

Hay ranks third in value of the farm crops in the United States, being exceeded only by corn and cotton.

Timothy, medium red clover, and alfalfa are the favorite hay crops in the order named, the first far in the lead. Other grasses largely used for hay are red-top, brome grass, Kentucky blue grass, buffalo grass, and foxtail millet, each flourishing best in certain localities. In many sections of the South, Bermuda grass is the favorite, while the cowpea has come more and more into favor there. On the Pacific coast wheat, oats, and barley are each harvested extensively for hay. Timothy is another of the many top-notchers that America has given to the world, being indigenous to the north-eastern states. It was named 150 years ago in honor of a New Hampshire farmer, Timothy Herd, who, with Yankee shrewdness recognized its value, and, with New England missionary zeal, did much to make known its good qualities to others; from him it is sometimes called timothy, at other times herds-grass. He introduced it into the Carolinas in 1720. Grasses should not be harvested more than one year, unless the land is restored by a liberal top dressing of barnyard manure or commercial fertilizer.

Red-top, brome grass, and Kentucky blue grass should be sown broadcast by hand. Timothy, cleaned Kentucky blue grass, clover, and alfalfa do better when a grass seeder is used.

Fall seeding is preferable except in exceedingly moist climates, and the seeding is generally done along with a "nurse crop"—a grain crop—since the grain will shade the ground and prevent the growth of weeds that would ruin the hay.

Rye

Common rye (*Secale cereale*) does not seem to have been cultivated so long as the other common cereals, though it was known to the Romans in Pliny's time. It does not grow as far north as barley, but succeeds in regions too cold for wheat and on soils too poor for any other grain. It is most productive where wheat will ripen, and is best adapted to light, sandy lands.

The varieties of rye are far less numerous than those of the other important cereals, and may be classified into winter and spring varieties. The former are most frequently grown and are sown in autumn, the latter early in spring.

Cultural management for a crop of rye is much the same as that for barley. Winter rye is usually ripe for cutting in June. A good crop is from 20 to 30 bushels of grain an acre.

On lands deficient in humus, rye is frequently grown for green manuring.

In Europe rye ranks next to wheat as a bread-stuff. When the grain is milled entire—the usual way—it contains more protein than wheat flour. Mixtures of wheat and rye flour, and of corn and rye, are often made for bread-making.

Buckwheat, Hops and Mushrooms

Buckwheat—The Farmer's Aid

This cereal will grow upon poor, thin, light soils, where other crops would not be productive at all, though the largest yields are obtained on fertile, well-drained, sandy loams. Upon a foul soil it occupies the entire ground, remorselessly driving out the weeds and leaving the land clean for another crop. Buckwheat prefers a moist, cool climate, and matures in 8 to 10 weeks, thus being adapted to short seasons and high altitudes. It is also valuable from its adaptability to the production of a crop late in the season on lands that have been too wet in the early part of the season for starting other crops. Sown as late as the middle of July in regions as far north as Iowa, it will mature a crop.

Because of its single, long tap-root, the buckwheat is excellent for deepening the fertile soil. Two or three crops will mellow up the most refractory soil. It serves well for this purpose as its growth is rapid and luxuriant. Buckwheat is sometimes sowed early in the spring to be plowed under as green manure for other grains. Three crops to the season may thus be grown. It makes a good "cover-crop" for orchards, sown after the middle of August.

The name buckwheat is generally admitted to come from the Scotch word *boc*—for beech—owing to its resemblance to the three-cornered beechnut.

Aside from its value as a palatable flour for winter use, on account of its heat-producing properties, the grain is valued as a stock food for fattening purposes; sheep love buckwheat straw, which is an excellent fertilizer, and buckwheat bran fed to cows adds to the quantity of the milk, though detracting from its quality. The crop is also grown as among the best of bee pastures.

Though this grain will succeed with less cultivation than any other crop (the surface soil needs to be finely pulverized and that is about all), yet a good preparation of the seed bed adds very materially in securing profitable yields of buckwheat.

Heavy applications of barnyard manure or nitrogenous fertilizers are not usually profitable because they increase the tendency of the crop to "lodge," and when once lodged the buckwheat never rises again. At the government experiment stations the application of 400 pounds of acid phosphate per acre for two seasons apparently almost doubled the yield of grain, but the third season the best results were obtained by the use of 150 pounds or less of the phosphate.

Early plowing to allow the ground to settle before the seed is put in is recommended. The seed is sown with the ordinary grain drill, or broadcasted; it is harrowed in the same as other grains. Three pecks of seed to the acre is sufficient on good soil, but on land of low fertility 4 to 5 pecks is used. Hot weather and frost are both injurious to the crop while the grain is forming, hence in the South the grain is sown from May to September; in the North from June 15 to about July 10. The plant blossoms for three weeks and the kernels ripen unevenly. Harvesting should begin when the first seeds are ripe, the immature seeds will ripen in the swath and over-ripe seed would shell out in handling. The grain is cut with the hand cradle or the dropper reaping machine. It ought to be cut while the stocks are damp with dew or moist after a shower, to avoid danger of the grains being shaken off in handling. It heats rapidly and should be left in loose shocks in the field and should not be mowed away in the barn too soon.

Because it leaves the soil peculiarly mellow, it has been found profitable to follow a buckwheat crop with potatoes in regions of rather heavy soils. Oats and corn are not best as following crops to succeed buckwheat. A good rotation is found to be clover, buckwheat, potatoes, oats or wheat; the clover can be harvested early and followed by the buckwheat, securing two crops for the season.

Hops

A soil capable of growing good corn is suitable for hops. The land should be high, sunny, dry, airy, rich, and mellow. Proximity to thick woods in a valley renders the plant liable to rust, mold, and blight. In planting, after richly fertilizing the land, plow deep, using a sub-soiler, and set out vines as soon as the ground can be worked in the spring, placing in hills eight feet apart.

The hop is propagated by cuttings from the most healthy of the old shoots; two buds are required, one beneath the ground from which will spring the roots and one above to develop into the stalk.

Any hoed crop can be raised the first year between the rows. The plant is a perennial but the vine dies down to the root every season. If trained on poles the pole should be about eight feet high. The vine turns from right to left, and will grow thirty feet in a season.

The value of the hop is determined by the amount of lupulin found in the flower; this furnishes the odor, taste, and medicinal property of the flower.

Hop-culture is first mentioned in history by Pliny. The Romans raised the plants as a garden vegetable, eating the young shoots as we do asparagus.

The leaves and spent hops are an excellent food for livestock, especially sheep.

Medicinally hops have tonic, stomachic, and narcotic properties. Hop pillows are used to induce sleep; hop poultices to allay pain.

Lippia—A Soil-Binder

The lippia, or fog-fruit, is a soil-binder and lawn plant for arid regions and sandy soils. It belongs to the same family as the lantanas and verbenas; is a perennial, much-branched, creeping plant and gives all the effect of a white clover lawn in regions where it is difficult or impossible to grow the usual lawn grasses. Along sandy shores, water courses, and to prevent washing of reservoir and stormwater embankments its use is unrivaled. It has maintained itself on the mesas of Arizona for eight months with less than two inches of rainfall and can endure temperatures ranging from 10 to 110 degrees Fahrenheit.

Mint

Is a hardy perennial of easy culture, grown in gardens for use in soups, sauces, salads, etc. It is increased by divisions of the roots, and planted at a distance of a foot apart. It soon forms a mass that can be cut from for years. It is grown to considerable extent in hotbeds and forcing pits for the spring markets.

Mushroom Growing

Mushrooms may be grown out-of-doors in the open field or lawn, when conditions are favorable. The spawn should be planted in rich, old, well-drained grass lands, avoiding wet or shady locations as well as dry and sandy soil. A V-shaped cut 4 inches deep should be made in the sod, a piece of spawn about 3 inches square inserted, and the sod replaced and firmed down so as to retain moisture, and the plant left to itself. The spawn should be planted about 3 feet apart for this open culture. Plant in June and you may expect mushrooms in August and September.

Grown indoors, the mushroom is the most profitable vegetable crop that can be raised for the amount of capital and labor invested. It is more over one of the most interesting crops for the amateur in that there appears nothing tangible to start with, since the eye can discern neither plant, seeds, nor roots.

Mushrooms may be grown either in houses especially erected for them or they may be grown in cellars, out-houses, sheds, under green-house tables, in stables, or in caves, as they do not require light.

The cool moisture and uniform temperature of a cellar is more congenial to their growth than rooms above ground. But if the cellar is beneath a dwelling, judgment must be used in placing the beds where there is no danger of the odors that may arise disturbing the occupants of the house.

The temperature should range between 55 and 65 degrees. The germs or spores are found in the gills of a perfectly developed mushroom and these, when falling into a congenial "soil," produce the spawn which may be bought of any seedman.

The beds may be about 4 feet wide, bounded by scantlings or boards about 10 to 15 inches wide. In these beds place fresh horse droppings from the stable mixed with the same weight (about 1/3 the bulk) of fresh loam from pasture or sod land. Beds should be pressed down with a brick but not packed too tightly, and should be 3 inches deep.

Make the beds for a crop wanted in winter about August or September. The temperature then is high enough to cause the spawn to germinate freely. Moisten the bed with water and leave to ferment.

Popcorn, Flax and Rice

Testing with a "hot bed thermometer," the temperature may rise to over 100 degrees; when the bed has cooled to 90 degrees insert the spawn. This is done by using a dibble and making, all over the bed, at a distance of a foot each way, holes four inches deep and in each hole placing a piece of mushroom spawn about the size of a hen's egg; firm it down and leave ten or twelve days, until the spawn have run through the whole bed, then cover the entire bed with two inches of well-pulverized loam to keep the heat in at an equable temperature, and over this spread three or four inches of hay or straw. The atmosphere may be kept moist by a few barrels of fermenting manure in the house. This does away with the risk of getting the beds too wet. But if watering is necessary use at a temperature of 80 to 100 degrees. And the temperature of the room should not fall below 50 degrees.

After the mushroom appears the soil must be kept moist.

The spawn planted in August will produce mushrooms in December or January. After the first crop is gathered an added half inch of soil on the top of the bed will result in a second crop often better than the first, and the bed may continue to yield until March or April.

Pepper Grass

Prized because of its exceedingly rapid growth, which makes it the very first of the green vegetables available from out-door planting in the spring, being ready for use before either the early radishes or new onions. A very rich, well-pulverized soil, prepared as for radishes, should be provided.

Pop-Corn

Broadly speaking, the same soil and cultivation required for sweet corn is suitable for pop-corn, and a small stand of pop-corn is a good feature for any home garden, especially where there are children, as it adds to their interest in mastering garden work. If grown in large areas it should be drilled in and not planted in checks. There are over a score of varieties of this corn which may be divided into three groups: Those having kernels broader than deep, as the Nonpareil; those with kernels broad as deep, which varieties include the Tom Thumb, Golden Pearl, and Dwarf Golden; while the Queen's Golden and various rice corns belong to a third group having kernels deeper than broad.

Large growers in the West have sometimes 1,000 acres devoted to pop-corn, and an ordinary yield with this specialized crop is 100 bushels to the acre. The usual yield, however, when grown by the average farmer, is 80 bushels to the acre at a cost of \$12 to \$15 an acre to put on the market. In nutritive value popped pop-corn has been found to contain 13.8 per cent protein, 5.7 per cent fat, 76.4 per cent nitrogen-free extract. Pop-corn with cream forms a highly nutritious article of diet, and at many sanitariums pop-corn has a regular place on the diet list.

Flax

While hemp is usually grown in America for its fibre, flax is more often grown here for the seed. It is a pioneer crop to a great extent, especially on the prairie lands of the Northwest. The pioneer breaking the sod on new prairie land turns it over to rot for a season before planting it to wheat; by planting flax on this freshly turned sod he secures a crop the first season. Two and one-half pecks of seed to the acre should be sown if flaxseed is the object, that the plant may develop many branches, each bearing seed. For fibre alone a bushel and a half to three bushels of seed is required. The thick growth allows for the development of but few seeds at the top but the fibre is of much finer quality. Both seed and fibre may be secured by sowing a medium amount of seed. The yield per acre is usually two or three tons of fibre or fifteen to twenty-five bushels of flaxseed (fifty-six pounds to the bushel). A bushel of seed yields about twenty pounds of oil, which, because of its quick-drying qualities, is highly esteemed for making paints and varnishes. Where labor can be had at low cost the flax grown for fibre is pulled by hand. By repeated sowing to flax, soils soon become "flax sick."

Rice

There are as many varieties of rice as there are of wheat or barley, 25 or more being generally considered; however, one catalogue classifies 161 varieties in the island of Ceylon, and it is claimed that 1,400 varieties exist in China, India, and Japan. Three main types are recognized in the United States: Honduras, Japan, and Carolina rice. It has been grown in the American colonies of South Carolina and Georgia for nearly 250 years, almost from their foundation.

Rice is more rich in easily digestible carbohydrates than is any other cereal and has few equals. In this respect, among the foods of man. The South Carolina rice is especially rich in fat and is held in high esteem. The unpolished rice is by far the most nutritious and preferable for food.

Rice flourishes in a sub-tropical climate and is more and more widely grown in the Gulf States. It is a grass, an annual, varying from one to six feet in height. It thrives best in low, marshy ground which can be overflowed, and in tide-water swamps, but must not be flooded with salt water. In southern areas, subject to inundation, its culture is comparatively easy, otherwise irrigation is necessary.

It is planted from March to June. The early plantings are usually covered with earth, when the fields are flooded to sprout the grain. The field is then drained and kept so until the crop is set, when another short flow is given.

The later plantings are in open trenches, where water is put on until the grain has taken root. It is then given air by slaking the water down to the surface, but holding the surface moist until the plants are well rooted, when the tides are let on again. A uniform covering of 3 to 6 inches is considered satisfactory, but 6 to 12 inches are recommended. Four to six months are required to mature a crop of rice. When the grains are in the milk the water is removed from the field until the crop ripens. This takes usually about a week.

The grain should be cut with sickles and bound in bundles and stacked. After a week or two it will get through the stack sweat and be ready for cleaning.

The enemies of growing rice are water-weeds and birds. To guard against the former the rice swamp may be drained for a season and planted to some other crop, when the water-weeds will naturally die out. The birds are the Rice birds (Bob-o-link) and the omnipresent English sparrow.

One species of rice, known as "Cochin China," is an upland rice and grows on the dry soils of Virginia, Maryland, and North Carolina, also in other sections. It endures a wider range of climate than the wet-grown rice. The upland rice may be grown upon any soil that will produce good corn or cotton. It thrives well on rich soil and in marshy bottoms. The land should be plowed in the fall, the ground must be thoroughly pulverized. The seed should be sown in June, in drills 30 inches apart and covered lightly. One to three bushels to the acre is required. The after culture is the same as for any other drill crop.

The upland rice produces 15 to 20 bushels to the acre, while the rice grown in the flooded fields will yield 30, 60, and even 100 bushels to the acre, each bushel of 45 to 48 pounds.

Sorghum

Wherever common corn will grow, sorghum, or sugar cane, will grow, whether it be in Vermont or Texas. Aside from its use for making molasses and sugar, it makes a more profitable green fodder for stock than does corn, since it contains more sugar. The cultivation of sorghum is the same as that of corn excepting that it is planted in drills, twenty-five or thirty grains to the foot of drill.

Cocoanut

The cocoanut tree is known as one of the great family of palms, attains a height of 60 and 100 feet, and bears from 30 to 100 nuts a year. Begins bearing after planting when seven years old and continues to bear for 70 years or more thereafter. Many uses are made of the cocoanut. The oil of the nut is one of its most valuable products. Ten nuts usually produce a quart of oil. The best oil is used for cooking purposes and the inferior sorts for illumination. Large quantities are imported into the United States for the manufacture of candies and soap.

ALFALFA

The Richest Forage Crop With Directions How to Plant, Cultivate and Successfully Grow Several Crops a Year

Alfalfa, though known to and highly esteemed by the ancients and one of the easiest things in the world to grow, was long regarded by the American farmer as a crop of mystery. Only within the past few years has this remarkable hay plant come into its own, so that it is now recognized as one of the hardiest of all plants, highly responsive to cultivation and a boon, if not a bonanza, to the enterprising and enlightened grower. Alfalfa was grown in ancient Egypt and Persia. It was introduced into Rome in 146 B. C. and has been cultivated in Italy ever since. In the 16th century it was imported into America by the Spaniards. Its introduction into the United States has been from both the east and the west.

Many Names

The botanical name of alfalfa is *medicago sativa*. It is also known throughout the world by the following names: Lucerne, French clover, Brazilian clover, Syrian clover, sainfoin, Spanish trefoil, purple medic, medica, common fodder, snail clover, branching clover, stem clover, monthly clover, horned clover, perennial clover, Burgundy clover, Welsh clover and Sicilian clover.

These names are given to the plant in English-speaking countries and indicate its widespread character and some of its characteristics. The names given to alfalfa in foreign languages would fill a column.

The importance of alfalfa to the farmer and stockman lies in the fact that it is the richest hay food known. An enthusiastic grower has said: "The cultivation and feeding of alfalfa mark the highest development of our modern agriculture. Alfalfa is one of Nature's choicest gifts to man. It is the preserver and the conservator of the homestead. It does not fall from old age. It loves the sunshine, converting the sunbeams into gold coins in the pockets of the thrifty husbandman. It is the greatest mortgage lifter yet discovered."

"The labor alfalfa performs in penetrating the subsoil is enormous. No other agricultural plant leaves the soil in such good physical condition. It prospects beneath the surface of the earth and brings her hidden treasures to the light of day. It forms a partnership with the micro-organisms of the earth, by which it is enabled to enrich the soil upon which it feeds. The farmer with a 50-acre meadow of alfalfa will have steady, enjoyable employment from June to October; for as soon as he has finished gathering the hay at one end of the field, it will be again ready for the mower at the other."

Grown Successfully in All Sections

Alfalfa is hardy, has a deep-feeding root system and is grown successfully in every section of the United States. But it demands proper treatment and a knowledge of the needs of the plant is necessary to successful growing.

The conditions as regards moisture are the dominating influence in growing alfalfa. Locality, altitude, soil and position are minor considerations. The expression so often heard, "Alfalfa will not stand wet feet," is literally true in every locality.

Necessary Soil Conditions

Choose a loamy surface with good drainage; this can best be obtained on a sloping hillside or on gently rolling land. The water level should be not less than three feet below the surface and the subsoil should be porous enough to permit the roots to penetrate to the saturated soil beneath. If the soil be water-logged less than three feet below the surface, alfalfa is unable to utilize its deep-feeding root system and the best results are not obtained.

Gently rolling land has the advantage in not having low, wet, flat spots in it where ice may form, a situation which is as detrimental as is standing water to a good stand of alfalfa. When the plants are dormant the field will stand flooding, but ice will kill them. It is essential that, if a soil is low and subject to standing water, complete drainage be provided before alfalfa is seeded.

Preparing the Soil

A soil intended for alfalfa growing must not be acid, because alfalfa will not thrive on acid soil. Its roots absorb the plant food in the soil for its nourishment, but this is not enough to satisfy the plant—it must have abundance of nitrogen, this it secures from the air by means of nitrogen-gathering bacteria which live in nodules on its roots. These bacteria cannot live in an acid soil and in such a soil it is impossible to establish them by artificial transplantation or otherwise, therefore, ground limestone must be applied in quantity sufficient not only to sweeten the soil but to keep it sweet for a term of years, if success in growing the crop is attained.

Where It Will Grow Best

It was formerly thought that only certain soils would grow alfalfa. Now it is known that, while it prefers rich, loose limestone soils, it will grow luxuriantly on strong, stiff limestone clays, once they are made dry with tiles and fed with manure. It grows on sand, when the sand is made rich. It grows away from limestone, when the land has been sweetened with lime. In fact there is hardly a type of soils in the United States that is not now growing alfalfa, under culturists who persist in giving the conditions that it needs and deserves.

Alfalfa is the most energetic soil-enricher of all the clovers, but it must find fertile soil on which to begin, and cannot, like sweet clover, begin on wornout lands. Once it is well established, however, its ability to build up the field on which it stands, and the adjoining fields (from the manure made by feeding the hay), is nothing less than marvelous.

Worth \$65 an Acre as Fertilizer

The New Jersey experiment station has shown that the yield of an acre of good alfalfa contains fertilizing ingredients that in the shape of commercial fertilizers would cost on the market at least \$65.00. So it can readily be seen that once alfalfa is established on a farm, and the hay fed thereon, and the manure saved, that farm must very rapidly increase in productivity.

Several Crops a Year

Alfalfa is a perennial, enduring on well-drained soil from five to fifty years with one sowing. It may be cut from three to five times a year, and will yield, in the regions of the corn-belt, from three to six tons of hay per acre.

The composition of alfalfa hay is such that it has almost the same nutritive value as wheat bran, and may be substituted for wheat bran in the ration of clover with good results. As a feed for all classes of live stock it is unexcelled.

Every animal upon the farm loves alfalfa, and thrives upon it.

As a pasture plant alfalfa has no equal in the amount which animals will gain from an acre of it; as much as 600 pounds of pork per acre being frequently reported where hogs have grazed it. It is also the best horse pasture known, and is sometimes used as a pasture for sheep and cows.

Alfalfa Seeding

Much needless mystery has been made of the question of seeding alfalfa. The best authorities now agree that the matter can be summed up in four words: Lime, drainage, humus, inoculation.

1. Lime is necessary on soils not naturally of limestone formation or filled with limestone pebbles. The importance of this is seen more and more each year.

2. As to drainage, there is no use in planting alfalfa on any soil where water may ordinarily be found at a depth of less than three feet. The alfalfa may grow all right until its roots strike this water, but then it will probably die.

Preparation of Ground—Proper Seeding

3. Fertile soil contains enough humus. Impoverished soils may be so deficient that special preparation must be made before alfalfa can possibly succeed. Stable manure, where obtainable is the very best thing for adding the proper humus to the soil, and its use wherever possible is advised. It might be best to use this a year in advance of sowing alfalfa, and follow with clean cultivation to overcome what weeds might be sown with the manure, or, a good way is to top-dress the alfalfa during its first winter, using a manure spreader and applying the manure evenly without large chunks that might smother the young plants. On impoverished soils, experts recommend preparation for alfalfa one or two years in advance, growing such crops as crimson clover, mammoth clover, cow peas, Canada field peas or soja beans, and preferably turning them under or else pasturing them off, so as to give the soil the greatest benefit possible from them.

4. Inoculation is recommended, not that it is always necessary, but because it is an inexpensive process and in five cases out of six it will actually pay. The methods are described later on.

Having determined that the soil is sweet, well drained, and sufficiently supplied with humus, the only questions that remain are: 1, the preparation of a good seed-bed; 2, sowing at the proper time of year; and, 3, the use of good seed.

Carefully Prepare Seed-Bed

For the seed-bed, it is essential that the ground be carefully fitted. It must be plowed, unless it is old ground, such as corn stubble, which may be thoroughly disked instead of plowing. It is better to firm the subsoil a little, so that only the surface is really loose. This, because if the entire soil is very loose, the seed may be planted too deep, and also because the alfalfa seems to prefer the sub-surface being a trifle firmed.

Time of Seeding

Alfalfa may be seeded in the spring, summer, or autumn, the time varying according to locality, the personal experience of the grower, or the nature of the previous crop or nurse crop, as it is generally called. In the Central States many successful growers sow alfalfa about the first week in April, using beardless spring barley as a nurse crop. Many farmers, using oats as a nurse crop, prefer to sow alfalfa later.

Where beardless spring barley may be used as a nurse crop, alfalfa experts advise the early spring seeding in the states of Ohio, Indiana, Illinois, Michigan, New York and part of Pennsylvania. The late seeding is preferable in some of the New England states, in Virginia, and in the states south of the Ohio River. In these states the alfalfa thrives better when sown late than when sown early. The farther south one goes the later it is safe to sow alfalfa. There are growers in Georgia, Alabama, Mississippi, Louisiana and Texas who seed as late as November 1st, but their winters are so mild that the alfalfa is never winter-killed, and it comes on the next spring in just as good shape as if it had been sown earlier in the season.

Seeding in August

In Illinois success has been attained by seeding in August, as by seeding at this time land can be utilized that has already produced a crop of grain, and the fall weeds are not so injurious. The young plants also begin to make their growth after the hot days of summer are past and are not so likely to be burned from excessive sun-heat. In ordinary years the young plants will reach sufficient size and maturity to stand the winter without loss, though if sown too late it is likely to get winter-killed because of immaturity at time of frost.

Seeding in August gives opportunity to harvest a crop of rye, wheat, oats, or potatoes and to thoroughly eradicate the weeds and grasses that are ever a serious trouble.

A good rule is to seed at such time as will enable the young plants to have made a vigorous growth before freezing weather.

Method of Seeding

If the farmer owns a special grass drill that can be adjusted to the sowing of alfalfa seed he will find it very satisfactory; if not a press wheat drill is the most practical machine for putting the seed in the ground.

The amount of seed to the acre varies between four and thirty pounds. The smaller amount of seed is sometimes sown when seed is desired from it, as it seeds better not to be thick.

There are 14,448,000 seeds in a bushel of alfalfa seed. Therefore to sow half a bushel to the acre would put 106 seeds to the square foot. To sow fifteen pounds would put on eighty-three seeds. Seeing that this is true, it is evident that it is more essential to have good seed and good distribution of the seed than to use a great amount of seed. About twelve to sixteen plants to the square foot are all that will ever stand, and on rich, deep soils they will not long endure even that much crowding.

Crops are often taken from the seed the same year, though alfalfa is not at its best until the third year; but it will yield very heavy crops the second year.

The depth that the seed should be sown varies according to the soil. In the Middle West where the soils are mostly black, loose, and loamy, the seed is sown about one and one-half or two inches deep, except in early spring sowings, when it is not necessary to sow so deep.

Good Seed Important

Good seed is of great importance. Alfalfa seed coming from South America, or Arabia, will grow all right the first year, and then will probably winter-kill the first winter, especially in any of the northern states. It has been found that the very best seed in the world, that which is freest from dangerous weeds and which possesses the greatest vitality, is produced in our own United States particularly in the northwestern part. Also it is better if grown on non-irrigated soil.

Kansas, Iowa, the Dakotas, Nebraska, Wisconsin, and Minnesota produce the alfalfa seed that is most highly esteemed by expert growers of the Middle West.

Clipping the Young Alfalfa

Weeds often come up to crowd the young alfalfa. To destroy these weeds clip the field with the mower, setting it to run as close to the ground as possible. There may come a yellowish rust that attacks the leaves. To destroy this clip close with the mower. Therefore when preparing land for alfalfa, see to it that the field is left as smooth as practicable, so that the mower may run over it in security. This trouble of the leaf rust will not be so much in evidence in western lands as in the lands east of the Mississippi river.

Time to Cut Alfalfa

Some successful growers cut alfalfa when about one-fifth of the plants begin to show bloom. A somewhat better way of ascertaining the proper time is to watch for the buds at the base of the plants and cut when they appear above the ground. These buds are the beginning of new stalks, and their appearance indicates that the plant is ready to make another crop.

Secure Crop Quickly

If possible, all of one crop should be cut down within a week, seeing that it is all ready at one time. Thus the hay is secured in best condition and the following crop is benefited by being given the space in which to grow.

Wide cut mowers are convenient things in the alfalfa field. After the hay is laid down the hay-makers should keep close watch, and as soon as it shows signs of drying and before the leaves fall from the stems, it should be raked into small windrows and permitted to cure in part in the windrow, or in the cock, according to where you are and what sort of climate you must work in. Alfalfa dried in the swath loses many of the leaves when raked.

Stack or put in the barn when cured, which will be in one to four days, according to weather conditions.

Inoculation

All legumes like the clover plants have tiny bacteria that work on their roots, forming "nodules." These bacteria draw nitrogen from the air, and both supply the plants with it and also add it directly to the soil. Without these bacteria the legumes will soon perish, although most of the legumes seem to find their proper bacteria in almost any soil. Alfalfa is an exception, and it nearly always pays to supply its bacteria artificially.

Alfalfa Soil from Another Field

This may be done very inexpensively. Obtain soil from some near-by alfalfa field and apply it at the rate of one hundred pounds per acre, sowing it late in the afternoon and harrowing it in immediately, before allowing the sun to strike it. This is the best way to inoculate. Soil from around the sweet clover or mellilotus roots answers equally well. The government will furnish inoculation of another sort free; this usually succeeds, but not always.

Another excellent way is to sow a few pounds of alfalfa seed with your red clover. After the clover is plowed up, sow alfalfa, and you will probably have the field inoculated.

Earth From an Old Field

Alfalfa will not thrive without the right bacteria upon the roots. Nor will milk sour without the bacteria of souring being present. And yet milk sours, and yet women folks do not add bacteria, knowingly, to their milk. Nevertheless, milk will sour more rapidly if a little sour milk is added to the sweet at milking time. So alfalfa will become inoculated by natural processes if grown on fit soil, but it will the sooner become inoculated if earth from an old field is dried in the shed and pulverized and sown broadcast over the field and harrowed in. There are also cultures available that are used to inoculate the seed. They are sometimes of use. They often fail to be of use, through some defect in the method. It is not worth while to bother with cultures.

It is worth while, when sowing alfalfa on land that has never had it before, to use soil from either an old alfalfa field or a sweet clover (mellilotus) patch. The bacteria that live on mellilotus are the same that live upon alfalfa.

Do not sow either alfalfa or bacteria upon soils not a fit home for bacteria. That means that the land should be dry, sweet, and stored with vegetable matter.

Field Management

It is sometimes a good practice to harrow a new alfalfa field after the plants have attained a height of three or four inches in order to stir the top soil; this, of course, depends upon the condition of the soil. Young alfalfa plants are easily affected by a compact surface soil. Set the harrow teeth at quite an angle and weight them down so they will penetrate the land. This treatment will pull out some small weeds and cover up others, but will not pull out many alfalfa plants because of their long tap root.

Do Not Mow Too Low

When clipping alfalfa, do not set the mower too close to the ground, because the plant must not be cut off below the lowest branch. Alfalfa plants require considerable top growth to balance their great root development and too close mowing will put them out of balance, kill some, and decrease the vitality of others so they cannot survive the summer.

How Treat Land After Crop

Harrowing or disking after cutting is necessary for successful alfalfa growing. Use a spring-tooth harrow or disk; if a disk is used, set the disks rather straight, but, in any event, see to it that the land

is well dug up, the crowns of the alfalfa plants split, and the grass and weeds destroyed. Do this thoroughly. It will not injure the alfalfa. It will help its growth, and at the same time retard the growth of grass and weeds. When a grower fails to give his alfalfa field this treatment he usually finds that the grass and weeds take the field in a few years.

Penetrate Soil Deeper

When the alfalfa is three years old the disk may be weighted and made to penetrate the soil at least two inches and this should be followed by a smoothing harrow to level the land again.

It is absolutely necessary that the soil be thoroughly stirred in order that the air may penetrate to the roots of the plants where the bacteria can gather from it the nitrogen so necessary to the growth of the plant.

Advantages of the Alfalfa Crop

What, briefly, are the advantages of the alfalfa plant over other forage crops?

First, that it roots so deep in the soil. It is safe to say that alfalfa roots penetrate as deep as there is any soil. If the soil is three feet deep, the roots will penetrate three feet. If the soil is ten feet deep the roots will go down ten feet. And if the soil is thirty feet deep, the roots will go down thirty feet. Thus the whole soil is utilized.

Second, the alfalfa plant uses the whole of the growing season, and it is the one crop that the farmer grows that does this. Soon after the corn is planted the alfalfa is ready to cut—by the first of June in most of the region of the corn belt, earlier in the South, and not much later anywhere. Thus the soil has yielded one crop almost before the corn has begun to take hold at all.

Three or Four Crops a Season

Third, there are three or four crops of alfalfa to the season. Thus it uses to the best advantage all of the soil, all of the season from early spring till late fall, and all of the soil moisture. Of no other crop can this be said.

Fourth, and best of all, the forage that the alfalfa plant produces is the richest and most palatable hay food that the farmer can grow.

Comparison of Corn and Alfalfa

It is hard for a farmer in the heart of the corn belt to consider seriously the demands of any other crop, says Mr. Joseph E. Wing, the Ohio alfalfa expert, yet if he will study alfalfa a little he will see that he is accepting no inferior plant when he puts it in place of some of his corn fields. Alfalfa will make, on good land in that region, a total yield during the season of from four to eight tons per acre. Taking six tons as a standard, and calling the hay worth \$8.00 per ton, there is thus derived from that acre a gross revenue of \$48.00. To equal that amount the field must yield 120 bushels of corn which must sell at forty cents per bushel. Or, put it according to the amount of available and digestible carbohydrates and protein produced by these crops, the alfalfa will yield fully three times as much protein as the corn and double the carbohydrates, too! Furthermore, the alfalfa is not depleting the soil, while corn is a robber crop.

FORAGE CROPS

A mixed crop of oats and Canadian field peas is recommended as being valuable for pasture, for cutting as a soiling crop, and when mature, for hay. When planted in succession of about two weeks, the first planting being as early in the spring as conditions will permit, a succession of highly nutritious forage is produced which is greatly relished by stock.

The following directions for growing this crop may be given:

The crop loves a mellow loamy soil, but will grow fairly well on soils ranging between heavy clay and sand and produce liberal returns. For early forage land should be selected which is moderately open and porous, so that the plowing may be done early. Those soils containing a comparatively large percentage of clay can better be used where late forage is desired.

Land should be plowed deep, and in cases where sod is inverted the jointer should be used. While the land is still rough, as left by the plow, the peas should be sown broadcast at the rate of about 1

bushel per acre. Then the harrow should be used and the land thoroughly firmed and firmed for oats. This firmed will cover the peas deeply and well, and it is to secure this deep covering that the peas are sown directly after the plow.

Oats may then be sown broadcast or drilled in the ordinary way, using 1 to 1½ bushels of seed per acre. If the soil is somewhat porous, sandy, or gravelly, the roller may follow the seeding. But should there be a somewhat large percentage of clay in the soil then the rolling would better be deferred until the young plants are 2 or 3 inches high, when the roller can be used without danger of producing injurious soil conditions due to packing.

Comparative tests were made at Cornell a few years ago of oats and peas; oats; barley and oats; and barley. The average yields were nearly 12, 8, 7.5, and 6.5 tons per acre, respectively. The estimated value of the food constituents per acre, calculated on the dry matter, is given as \$63.11 for oats and peas, \$57.99 for oats alone, \$43.39 for oats and barley, and \$21.99 for barley alone.

THE SILO ON THE FARM

Illustration Showing How Silo Is Made, Location, How the Silo Is Filled From Power Which May Be Supplied by Automobile

Keeping in mind the fact that ensilage is literally fodder kept in a pit, the principles requisite for a good silo are more easily grasped.

The first requisite of a silo is that it must be airtight, with smooth perpendicular walls that will allow the mass to settle without leaving open spaces along the walls, and the walls must be firm so as not to spring with the pressure of the mass as it settles. The bottom may be of clay, but the use of stones covered with cement is preferable. The foundation should be set below the frost-line, in northern climates the wall should run down five feet below the surface.

Since the object is to have the least possible surface exposure, the round form of silo is preferred. It must be emptied from the top in even layers, so as to expose the silage as little as possible to the action of the air.

As it must be visited twice a day, the silo should be located near the barn, but not where the odors from the open silo will penetrate the stable at milking time to affect the milk. The roof should have a

dry roughage, and it is always well to avoid feeding it excessively.

Corn is the preferred ensilage crop, and the favorite time for cutting is when it has reached the roasting-ear stage; the slow-growing varieties are best, as they continue to grow later and produce a greater yield of ensilage to the acre than those varieties grown chiefly for the grain. Next to corn comes clover and alfalfa, followed by sorghum, cow-peas and soya-beans, with beet pulp near the front rank where easy access to a sugar beet factory is to be had. Oats, rye, kafir corn, and milo maize are used in different sections.

How Big a Silo Shall Be Built

Allow 40 pounds of silage per day for each mature cow and half this amount for each head of young stock. Figure on feeding the silage for about 200 days each year.

The deeper the silo in relation to its diameter and the tighter and better it is built, the smaller the



Filling the Silo. Special Power Machine at Right. Belt Extending from Machine to Silage at the Left.

cupola for ventilation, and in extremely cold weather this will be closed to prevent freezing. If it can be placed south or east of the barn the danger of the silo's being blown over by wind-storms is lessened.

In building of brick it is economy to use brick of a high grade. Strength, durability, and a smooth inside wall, impenetrable to the air, are objects aimed at.

A stave silo built on the principle of a stave water-tank or cistern may be bought ready to place on a cement foundation, such silo of 16x32 feet dimensions, but without foundations, costing about \$300, the cost of a concrete silo of equal dimensions is \$300 to \$500.

It is advisable for three or four farmers located close together to buy a silage cutter together. Then by helping each other they are able to fill the silo for the group at the minimum expense. The cutters used to fill medium to large size silos have a capacity of from 10 to 15 tons per hour.

Silage is pre-eminently a cow food; steers may be fed to advantage 40 to 50 pounds a day; moderate quantities, up to about 20 pounds a day, is good to mix with the rations of horses; sheep-men look upon it with great favor, especially for ewes at lambing time; and opinions vary as to its value for hogs. Silage must always be fed in connection with some

allowance that must be made for spoiled material. In any case it is wise to build a bigger silo than you absolutely need, to allow for shrinkage, an unexpected long season, and a possible increase in the size of your herd.

The Dairy Division of the Department of Agriculture has for a number of years conducted experiments in growing, preparing, and feeding silage. The results of these investigations have lately been summed up:

Cost accounts kept for silos on thirty-one farms in Wisconsin and Michigan show that the cost of putting up a ton of silage varies from 46 to 86 cents. Cost records kept for eighty-seven silos in various parts of the United States give 87 cents a ton as the average cost of filling.

"The cost of producing a ton of silage," explains the Department, "varies, of course, with the acre yield, the cost of growing an acre, and the cost of filling the silo. In general, it may be stated that from \$1.50 to \$4 a ton represents the limits between which most of the silage is produced."

As to the use of silage the Department draws from its records of various feeding experiments with various classes of cattle several rations that have been found to give satisfactory results.

Amount of Silage Consumed in Different Parts United States

Amount of Silage Required Per Day

Rations for dairy cows are classified in accordance with milk yield and the quality of this yield, as follows:

For a 1800-pound cow yielding 40 pounds of milk testing 3.5 per cent: Silage, 40 pounds; clover, cow-pea, or alfalfa hay, 10 pounds; grain mixture, 10 pounds.

For a cow of the same weight yielding 20 pounds of 3.5 per cent milk: Silage, 40 pounds; clover, cow-pea, or alfalfa hay, 5 pounds; grain mixture, 5 pounds.

For a 900-pound cow yielding 30 pounds of 5 per cent milk: Silage, 30 pounds; clover, cow-pea, or alfalfa hay, 10 pounds; grain mixture, 11 pounds.

For a cow of the same weight yielding 15 pounds of 5 per cent milk: Silage, 30 pounds; clover, cow-pea, or alfalfa hay, 5 pounds; grain mixture, 5 pounds.

Mixture of Grain for Silage

A good grain mixture to be used in a ration that includes silage and some sort of leguminous hay is composed of: Corn chop, four parts; wheat bran, two parts; linseed-oil meal or cottonseed meal, one part.

The Department classification rations for fattening steers according to locality. The following rations have been found highly satisfactory for a 1000-pound steer:

For the Corn Belt. Ration 1: Corn silage, 25 pounds; corn stover, 5 pounds; cottonseed meal or oil meal, 3 pounds; shelled corn, 14 pounds.

Ration 2: Corn silage, 25 pounds; clover hay, 7 pounds; shelled corn, 15 pounds.

For the Eastern States where hay is very high and corn is relatively high: Corn silage, 30 pounds; corn stover, 5 pounds; cottonseed meal or oil meal, 4 pounds; shelled corn, 10 pounds.

For the South where cottonseed meal is of moderate price and cow-pea hay is raised on the farm: Ration 1: Corn silage, 35 pounds; cow-pea hay, 5 pounds; cottonseed meal or oil meal, 7 pounds.

Ration 2: Corn silage, 30 pounds; cottonseed hulls, 12 pounds; cottonseed meal, 7 pounds.

For the West where corn cannot be raised. Ration 1: Kafir silage, 30 pounds; prairie hay, 3 pounds; cottonseed meal, 3 pounds; kafir meal, 10 pounds.

Ration 2: Kafir silage, 25 pounds; alfalfa, 7 pounds; kafir, 15 pounds.

Pays for Itself Yearly

It is claimed by some that "one could build a silo, fill it, and destroy it every year, and still make

money on the investment." It is stated authoritatively that "the man who feeds ten head of cattle without a silo for a year loses the cost of the silo and still has none."

A pioneer silo company reports:

"A silo will pay for itself in a single year, and the years to come it is a clean and usually an enormous profit."

"And the silo is the best means yet found of conserving the land. It gives value to products of the farm that without the silo would be wasted, and by stimulating feeding as against the sale of grain it puts the farmer in a position to turn out the finished product, the marketable live stock and dairy products."

In turning out only the finished product the farmer keeps the manure, the fertilizing value. He sells product and not farm, and the latter keeps on developing and getting better from year to year instead of undergoing a gradual but sure impoverishment."

Feeding Value of Silage

It is well known that cows produce more milk when fed green, succulent feed than when kept on dry feed. June is usually the month when the cows yield their largest flow of milk. This is due chiefly to the fact that they have been turned onto fresh green pastures where they get an abundance of succulent feed in cold winter months, when the pastures are frozen and covered with snow. Silage, properly preserved, furnishes feed that is highly nutritious and keeps the cow's digestion and appetite in the best possible condition. Silage is recognized by successful dairymen as absolutely necessary for economical milk production.

Advantage of Corn Silage

The superiority of corn silage over dried corn fodder lies in the fact that the silage is juicy and appetizing, cattle relish it when they would reject ordinary dried fodder. The Vermont Experiment Station made a careful test of the relative values of corn silage and dried fodder. The results were:

24,854 pounds of green fodder corn, when dried and fed with a uniform allowance of hay and grain produced 7,084 pounds of milk.

24,854 pounds of green fodder corn, converted into silage and fed with the same ration of hay and grain as was fed with the dried fodder, produced 9,525 pounds of milk.

Four acres planted in corn will produce about 40 or 50 tons of silage, with only an average crop. Forty tons will feed ten cows 200 days, allowing 40 pounds of feed per day for each cow.

BUSHELS OF CORN ON AN ACRE

How Many Bushels of Corn Can Be Grown on an Acre?

Shelled Corn Produced on One Acre, 160.4 Bushels

For four years the Bowker Fertilizer Company conducted special scientific crop growing contests for cash prizes. The first two were corn contests in which \$1000 was offered each year for the largest yields of crib-dry corn containing not over 12 per cent moisture. Each contest acre was a measured acre and the crops were harvested in the presence of several disinterested witnesses. The samples were sealed and sent to the Massachusetts Agricultural Experiment Station, where they were tested for moisture, protein, fat and carbohydrates. This resulted in a very interesting and instructive comparison between the flint and dent varieties, but the greatest value of this analysis was the determination of amount of moisture and of cob.

One of the samples analyzed as high as 73 per cent of water and cob, and in order to determine the actual winners producing the greatest dry food value per acre, all the yields were reduced to the 12 per cent moisture basis. The result was that many crops which were large at harvest time were fairly well down the column in the final report.

Contest of 1910, 27 Contestants

There were 27 contestants who finished in the 1910 contest. The grand prize crop as harvested was 126.8 bushels and when reduced to a basis of

12 per cent moisture it was found to be 103.23 bushels of crib-dry shelled corn. This crop was grown by Perley E. Davis, Granby, Mass., and was awarded the grand prize of \$500.

Contest of 1911, 39 Contestants

In the contest for 1911 there were 39 contestants who finished. The grand \$500 prize was won by Lester S. White, Collinsville, Conn., with a yield of 160.4 bushels, harvest measure, which by analysis was found to equal 112.68 bushels of crib-dry shelled corn per acre, containing 12 per cent moisture.

The average yield of the two first prize winners in the two contests was 107.95 bushels of crib-dry shelled corn containing 12 per cent moisture. The average yield of all the contest acres for two years was 59.05 bushels crib-dry shelled corn per acre. The average yield for the New England States in which this contest was held was 45.5 bushels to the acre as harvested, and for the entire United States 27.4 bushels to the acre, field run. When we read about these phenomenal yields of 150, 200 and 250 bushels of shelled corn per acre, we should ask what was the moisture at harvest time. Water and cob should not be reckoned as shelled corn, and were not in these tests.

IRISH POTATOES

POTATOES

SWEET POTATOES

How Prepare Soil, Cultivate and Raise Potatoes



Irish Potatoes



Sweet Potatoes

Irish Potato Culture

The value of a potato crop to the grower depends mainly upon the yield and the size, form, and healthy condition of the tubers. Perfect tubers find ready sale at the best prices, while the yield in itself has no effect on the transaction, and the chemical composition of the potatoes is, as a rule, disregarded by the buyer, unless they are to be used in starch-making.

In every 100 pounds of average potatoes there is 75 pounds of water. Of the remaining 25 pounds about 20 pounds is carbohydrates (starch and sugar, etc.) and 2 pounds protein.

The chief value of the potato for food as well as for starch-making lies in the starch which the tubers contain. The protein content is low and the carbohydrates high, and, therefore, potatoes are especially valuable for use in connection with foods rich in protein, such as lean meat, eggs, etc., to furnish a well-balanced diet.

Thorough tillage of potatoes is highly important, but intensive tillage alone is not sufficient to produce a large yield. Intensive tillage may be overdone. During a drought only so much tillage is necessary as shall keep the surface mulch loose and thoroughly dry. The drier the surface layer of soil the more slowly will moisture be absorbed by it from the layers of subsurface soil.

Harrowing potato land before the plants appear above ground is considered a wise practice. In an important series of experiments conducted by the New York Cornell Station, the use of Bordeaux mixture in nearly every case resulted in an increased yield, even when blight was not prevalent, and thorough spraying with this material is therefore recommended as a general practice. Pruning potato vines to one main stem was not beneficial.

Potato machinery, while not yet perfected, has reached such a degree of perfection that where potatoes are grown upon any considerable area, special potato machinery should be provided. Implements should be purchased which are found adapted to the local conditions.

There is no royal road to success with potatoes. Methods of procedure which are applicable in one season must be modified to meet the requirements of another season; treatment which might be radically wrong when applied to one soil. Success will be attained only by familiarity with the plant and its habits, and then conditions must be made to meet as completely as possible the requirements of the plant. The general adoption of the common potato as an article of food by the Irish people in the middle of the 18th century, gave the name Irish to this potato.

The Sweet Potato

A sandy loam and fourteen to sixteen weeks of hot, growing weather is what the sweet potato asks. If to this can be added lots of rain in the early part of the season and comparatively dry weather for ripening and harvesting, a crop of 200 bushels to the acre may be expected, with proper cultivation. Crimson clover in the North and cowpeas in the South are good crops to precede the sweet potato because they add nitrogen and humus, subsoil the earth, and leave it in good physical condition, and aid in keeping the soil mellow as is required for well-formed sweet potatoes. Ten tons of manure, with 25 lbs. of nitrogen, 50 lbs. phosphoric acid, and 75 lbs. of potash, may be used per acre as fertilizer. Well-rotted horse manure, ten to twenty tons to the acre, is also good. Deep plowing increases the yield of potatoes, but has a tendency to make long potatoes, which are not as popular in the markets. The fertilizer should be applied in the furrow after the land is plowed, then harrowed in. Next, the land is thrown up into beds or ridges three or four inches high, with the centers of the ridges about three and one-half feet apart, and the sets planted eighteen inches apart in the row.

The sweet potato may be planted like the Irish

potato, by cutting in pieces and planting the "eyes" but the usual way is to plant in a hotbed. The tubers are placed quite close together, but not touching, and covered with manure; they are then covered with three inches of soil, the bed covered with glass, and watered as often as necessary. The shoots, or sets, that develop should not be transplanted to the field until the ground is quite warm—about the first of June in the latitude of Iowa or Michigan. The vines or runners may be lifted from time to time with a pitchfork if there is a tendency to root. Good cultivation is absolutely necessary. It should be frequent and shallow, to save moisture. Black-rot is to be guarded against. If a plant shows a leaf that is black it should be dug up and destroyed, and, as the germs of black-rot remain in the soil over winter, the same ground should not be used again for sweet potatoes.

Digging may be begun as soon as ripe, to supply immediate demands, but the main crop is not dug till about time of first frost. The potatoes should be stored in a well ventilated place in the shade.

Yams are a variety of sweet potatoes, popular in the South and are larger than the ordinary sweet potato. Both are natives of America.

POTATOES ON AN ACRE

To test the possibilities of an acre the Bowker Fertilizing Company, of Massachusetts, has been giving prizes for best productions, with following result on potatoes:

Potatoes Produced on One Acre, 545.4 Bushels

For two years there were conducted potato contests based on quality and size as well as yield, which is a new way of deciding such contests. The crops were planted on measured acres and dug and sampled in the presence of witnesses. The samples were tested for cooking qualities by three experts, a woman (professor of household economics), a professor, and a potato merchant, who filled and baked the potatoes under precisely the same conditions and scored them accordingly. They also scored the potatoes for appearance, size, etc. Finally the potatoes were tested for starch by Professor Philip H. Smith of the Massachusetts Agricultural Experiment Station at Amherst. All the judges and the chemist worked on samples marked with the contestant's numbers. The names were unknown to them.

There were 33 contestants who finished in the 1912 contest. The grand prize crop was 545.4 bushels, 77 per cent of which (419 bushels) were table size, scoring perfect as to cooking qualities and almost perfect in appearance, shape, etc. This crop was grown by L. A. Littlefield, Lincoln, Penobscot County, Maine, and was awarded first prize of \$200.

In the contest for 1913, New England was divided into two zones. There were 20 contestants who finished. The first prize of \$100 in the northern zone (Me., N. H., and Vt.) was won by Alvin R. Cobb, Lee, Penobscot County, Maine, for a yield of 502.6 bushels, 75 per cent of which (378 bushels) were table size, scoring 85 out of a possible 100 in cooking quality and appearance.

Mr. Cobb's acre was planted on a rocky loam soil which yielded about one-half ton of hay in 1912. The rows were 33 inches apart and seeded with Green Mountain cut by gus, planted 10 inches apart in the rows by machine and covered 4 inches deep. The place was cultivated three times and had three times and sprayed twice with Pyrox. 2,200 lbs. of a patented Potato Manure was applied, 400 lbs. broadcast and 1,800 lbs. in the drill. No other fertilizer or dressing of any kind was used. The entire crop weighed 30,156 lbs., which is equal to 502.6 bushels.

The second prize was awarded to O. B. Keene of Liberty, Maine. His acre was planted on dark loamy soil which produced in 1912 without any fertilizer about 800 lbs. of hay to the acre. In 1913 it was planted in potatoes in rows 32 inches apart and seeded with Cuban Multipliers, cut 1 to 3 eyes, dropped 8 inches apart in the rows, covered 6 to 8 inches deep and was cultivated by bushing 3 times with a heavy brush harrow until perfectly level.

When the plants broke through the ground they were hoed and buried, and in 11 days buried again. He applied 1,000 lbs. of commercial fertilizer, 1,000 lbs. in the drill, the balance broadcast. The yield was 418.5 bushels, of which 72.01 per cent were table size, 23.41 per cent under 4 ozs., and 1.58 per cent above 12 ozs.

The first prize in the southern zone (Mass., R. I., and Conn.) was won by A. W. Butler, Brockton, Mass., whose yield was 363.1 bushels from one acre, 72.51 per cent of which (263 bushels) were table size, scoring 82 out of a possible 100 for cooking quality and appearance.

Mr. Butler's acre was planted on "rocky loam" which produced about 2½ tons of hay per acre in 1912, which had been grown on barn manure. The rows were 30 inches apart and seeded with Green Mountain cut to two eyes, planted 14 inches apart by hand, and covered 3 inches deep. The place was cultivated five times by machine. First when the potatoes were two inches high and then about every two weeks. The acre was sprayed with Pyrox when the plants were about 4 inches high and then about every two weeks until they had been sprayed five times; altogether 2,800 lbs. of commercial fertilizer was applied, 2,100 lbs. broadcast and 700 lbs. in the drill.

One important fact has been demonstrated by these contests, namely, that apparently the starch content has no dependable relation to cooking quality. For example, Mr. Keene, who took second prize in the northern zone for 1913, scored 102 for starch and 17 on maleness, while Mr. Demeritt, who took third, scored only 69 on starch but got 18 on maleness. Thus these results confirm the conclusion that high starch content does not necessarily mean high cooking quality, and that the only way to determine cooking quality is to make an actual cooking test of representative samples. Over one-half of the crops ran over 300 bushels of potatoes per acre.

The average yield of potatoes in New England for the northern zone is only 156 bushels per acre and in the southern zone 107 bushels, and 89 bushels per acre for the whole country. The average yield in this contest was 363.1 bushels per acre for the northern zone and 247.4 bushels for the southern zone.

These corn and potato contests, which have been conducted for four years on strictly scientific lines, have attracted not only the attention of practical farmers but have been followed with great interest by the Department of Agriculture, and by scientific men and economists throughout the country.

FERTILIZERS FOR SALE BY ALL NURSERYMEN

Keep Up Fertility in the Soil.

Potato Manure. Its great potash content makes it very valuable for use on all root crops, also on fruit lands. It works well on grass and fruit in connection with bone meal, and makes a valuable and lasting top-dressing. 2 per cent ammonia, 5 per cent available phosphoric acid, 10 per cent potash. Per sack, 200 lbs., \$3.50; per ton, \$28.

Potato and Truck Special. A high grade fertilizer for the vegetable and truck garden, especially recommended for beans, corn, eggplants, tomatoes, potatoes, and all other root crops. Sacks of 200 lbs., \$3.75; per ton, \$32.

Poudrette (Native Guano). Contains all the elements necessary for plant life, used extensively by market gardeners. An excellent lawn top-dressing. Per 100 lbs., \$1.50; 200 lbs., \$2.75; 1,000 lbs., \$9.50; per ton, \$18.

Soil, Agricultural. For top-dressing asparagus beds. Apply very early in spring at the rate of 800 to 1,000 pounds per acre. 200 lbs., \$1.50; per ton, \$10.

Sheep Manure, Pulverized. A pure natural material, unequalled for mixing with potting soil, for lawns, general vegetable and flower garden fertilizer, for making liquid manure water, or for any purpose where quick as

well as lasting results are wanted. 2-lb. package, 15c; 5 lbs., 25c; 10 lbs., 40c; 25 lbs., 75c; 50 lbs., \$1.25; 100 lbs., \$2; 500 lbs., \$9; 1,000 lbs., \$16; ton, \$30.

Soot. The leading growers recommend the use of soot to produce plants of a good healthy color; destroys insects and grubs in the soil, and should be spread on greenhouse staging and flower beds; then stir the soil. 25 lbs., \$1; 100 lbs., \$3.50.

Tobacco Stems. A lawn covering for winter. It not only acts as a protector, but imparts large quantities of ammonia and drives away insects and moles. Bbl., \$1; bale, \$2; ton, \$12.

FERTILIZERS

Fertilizers for Farm, Lawn, Garden and Greenhouse

For Sale by All Nurserymen and Seed Dealers.

(Fertilizers marked * can be sent by Parcel Post at purchaser's expense. Consult your local post-office for rate from wholesale houses. We give approximate prices at which the fertilizers may be bought from dealers because users will thus be enabled to estimate the cost.)

Animal Base and Potash Compound. For all crops. Superior for broadcasting in spring prior to harrowing. 2 per cent ammonia, 8 per cent Av. Ph. Acid, 2 per cent potash. Per sack, 200 lbs., \$3. per ton, \$23.50.

Blood (dried). One of the quickest acting fertilizers, being immediately soluble. 5 lbs., 30c; 10 lbs., 50c; 50 lbs., \$2; 100 lbs., \$3.75.

Bone Flour. Ground very fine; excellent for pot plants or beds where an immediate effect is wanted. 5 lbs., 25c; 100 lbs., \$2.50; bbl. of 200 lbs., \$4.50, ton, \$40.

Pure Bone Meal. A standard fertilizer for all purposes, safe and effective. 3 lbs., 15c; per ton, \$33.

Ground Bone. A little coarser than above; excellent for grass plots, gardens, etc. Apply 400 to 600 lbs. to the acre. 5 lbs., 25c; 25 lbs., 75c; 50 lbs., \$1.25; sack of 200 lbs., \$3.75.

Coarse Bone. Ground coarse, for grape borders and poultry. A superior fertilizer to use when planting shrubbery and trees. 5 lbs., 25c; 50 lbs., \$1.25; per ton, \$33.

Cattle or Cow Manure, Shredded. For garden, lawn, and greenhouse, and especially good to mix with compost and for water lilies. 100 lbs., \$2; 500 lbs., \$9; 1,000 lbs., \$18; per ton, \$30.

Clay's Fertilizer. (Imported) Recommended to all who grow either fruit, flowers, or vegetables. Should be used in potting soil and spread on staging of greenhouses planted with flowering plants. 28 lbs., \$2; 50 lbs., \$3.50; 112 lbs., \$6.50.

Hardwood Ashes. Good dressing to apply to orchards. Should be applied late in fall or early spring. This is a splendid fertilizer for the lawn and garden, containing all of the fertilizing elements except nitrogen. If used on the lawn at the rate of a ton or more per acre as a first application, and annual dressing of 300 pounds afterwards, will insure a thrifty growth of dark color, exemption from ill effects of dry weather, and freedom from weeds. It is also beneficial to vegetables and field crops, and especially recommended to cabbage and onion growers. 100 lbs., \$1.50; per bbl., \$2.50; per ton, \$22. Special price by the car.

Kainit (German Potash Salt). Analysis: 12 per cent actual potash. Excellent to apply in fall or winter on lawns or vegetable garden. Apply 1,000 lbs. per acre. 100 lbs., \$1.25; 200 lbs., \$2; per ton, \$15.

Land Plaster. Much used in composting or mixed with guano, etc. 100-lb. bag, \$1; bag, 200 lbs., \$1.50; per ton, \$10.

Lime (hydrated). For lawn and field use where the ground has become sour. 100 lbs., \$1; ton, \$12.50. Special price by the car.

Manure. Fresh horse manure by carload. Write for prices.

Muriate of Potash. 80 per cent pure, equivalent to 48 to 50 per cent actual potash. A high

grade fertilizer and one of the best orchard fertilizers known. 25 lbs., \$1; 50 lbs., \$1.75; 100 lbs., \$3. Original sacks of 200 lbs., \$5.50.

Nitrate of Soda. A fertilizer for all crops. It is very quick in action and hastens maturity of crops fully two weeks. Being quickly soluble, it should not be applied until the plants are above ground, when 200 to 300 lbs. mixed with land plaster is sufficient per acre. Nitrate of soda does not exhaust the land. 5 lbs., 25c; 25 lbs., \$1.25; 50 lbs., \$2; 100 lbs., \$3.50. Large quantities, prices on application.

"Peerless" Plant Food for House Plants. (Odorless.) May be used either dry or liquid, the latter much the best, being immediately available to the plant, and less danger of giving an overdose. Put up in 1/2 and 1-lb. packages. Directions for use with each package. 15c and 25c, by mail, 25c and 40c.

"Peerless" Plant Food for Lawn and Garden. (Odorless.) A high-grade fertilizer. Apply at any time during spring or fall. It will restore lawns to full luxuriance, and acts quickly in the vegetable garden, where it can be applied at any time during the growing season. 5 lbs., 25c; 10 lbs., 40c; 25 lbs., \$1; 50 lbs., \$1.75; 100 lbs., \$3; 200 lbs., \$5; ton, \$45.

Peruvian Guano Substitute. For potatoes and all vegetables. Since it is difficult to procure pure Peruvian guano, this is a good all-round fertilizer. 5 per cent ammonia, 8 per cent available phosphoric acid, 7 per cent potash. 50 lbs., \$1.50; 100 lbs., \$2.50; sack of 200 lbs., \$4; ton, \$36.

Weights and Measures

Troy Weight
24 grains.....1 pwt.
20 pwt.....1 ounce
12 ounces.....1 pound
Used for weighing gold, silver, and jewels.

Apothecaries' Weight
20 grains.....1 scruple
3 scruples.....1 dram
8 drams.....1 ounce
12 ounces.....1 pound
The grain, ounce, and pound in this are the same as in Troy Weight.

Avoirdupois Weight
27 11-32 grains.....1 dram
16 drams.....1 ounce
16 ounces.....1 pound
25 pounds.....1 quarter
4 quarters.....1 cwt.
2,000 pounds.....1 short ton
2,240 pounds.....1 long ton
The avoirdupois pound contains 7,000 Troy grains, the Troy pound 5,760 grains.

Dry Measure
2 pints.....1 quart
4 quarts.....1 peck
4 pecks.....1 bushel
80 bushels.....1 chaldron

Liquid Measure
4 gills.....1 pint
2 pints.....1 quart
4 quarts.....1 gallon
8 1/4 gallons.....1 barrel
2 barrels.....1 hoghead

Time Measure
60 seconds.....1 minute
60 minutes.....1 hour
24 hours.....1 day

7 days.....1 week
28, 29, 30, or 31 days.....1 calendar month (30 days, 1 month in computing interest.)
365 days.....1 year
366 days.....1 leap year

Circular Measure
60 seconds.....1 minute
60 minutes.....1 degree
90 degrees.....1 sign
90 degrees.....1 quadrant
4 quadrants 12 signs, or 360 degrees.....1 circle

Mariners' Measure
6 feet.....1 fathom
120 fathoms.....1 cable length
7 1/4 cable lengths.....1 mile
5,280 feet.....1 statute mile
6,080 feet.....1 nautical mile

Long Measure
12 inches.....1 foot
3 feet.....1 yard
5 1/2 yards.....1 rod
40 rods.....1 furlong
8 furlongs.....1 statute mile
3 miles.....1 league

Cloth Measure
2 1/4 inches.....1 nail
4 nails.....1 quarter
4 quarters.....1 yard

Paper Measure
24 sheets.....1 quire
20 quires.....1 ream (480 sheets)
2 reams.....1 bundle
5 bundles.....1 bale

Miscellaneous
3 inches.....1 palm
4 inches.....1 hand
6 inches.....1 span
18 inches.....1 cubit

21 1/2 inches.....1 Bible cubit
2 1/2 feet.....1 military pace

Square Measure
144 square inches.....1 square foot
9 square feet.....1 square yard
36 square yards.....1 square rod
40 square rods.....1 rood
4 roods.....1 acre
640 acres.....1 square mile

Surveyors' Measure
7.92 inches.....1 link
25 links.....1 chain
4 rods.....1 chain
10 sq. chains or 160 sq. rods.....1 acre

640 acres.....1 sq. mile
36 sq. miles (6 miles square).....1 township

Measurements of Area.
220 feet by 108 feet.....1 acre
110 feet by 396 feet.....1 acre
80 feet by 726 feet.....1 acre
120 feet by 363 feet.....1 acre
300 feet by 145 1/2 feet.....1 acre
400 feet by 108 1/2 feet.....1 acre
210 feet by 210 feet.....1 acre

The last is approximate
Cubic Measure
1,728 cubic inches.....1 cubic foot
27 cubic feet.....1 cubic yard
128 cubic feet.....1 cord (wood)
40 cubic feet, 1 ton (shipping)
2,150.42 cubic inches.....1 standard dry bushel
281 cubic inches.....1 standard liquid gallon
230.8 cubic inches.....1 standard dry gallon
1 cubic foot.....about 4-5 of a bushel

BARNYARD MANURE SAVING MANURE

MANURES

USE OF MANURE COMPOSTS

In those regions where fertilizers are extensively used it is of the greatest importance to know with reasonable exactness the varying fertilizer requirements of different soils and crops in order to get the greatest return from the fertilizers applied. A commonly accepted method of securing this information is by means of plot experiments, in which the crops are grown on the different soils with the various fertilizers whose merits are to be tested. Many of the experiment stations have carried out extensive experiments of this kind, in cooperation with farmers, on a great variety of soils and crops; but the safest plan is for each farmer to test the question for himself on his own soil, using the results of experiments on other soils only as general guides in the use of fertilizers in default of such tests.

Barnyard manure is easily the most important of all fertilizers. A well-kept manure heap may be safely taken as one of the surest indications of thrift and success in farming. Neglect of this resource causes losses, which, though little appreciated, are vast in extent. Waste of manure is either so common as to breed indifference or so silent and hidden as to escape notice.

Loss from Wasting Manure

Experiments indicate that if the horses, mules, cattle, hogs and sheep in the United States were kept in stalls or pens throughout the year, and the manure carefully saved, the approximate value of the fertilizing constituents of the manure produced by each horse or mule annually would be \$27, by each head of cattle \$20, by each hog \$8, and by each sheep \$2. In the aggregate the value of these fertilizing materials would reach a fabulous amount—considerably over two billion dollars.

Discussing this subject from a practical standpoint, a well-known expert has suggested the sum of \$250 as a conservative estimate of the value of the manure produced during seven winter months on a small farm carrying 4 horses, 20 cows, 50 sheep and 10 hogs.

It should be clearly understood that when the farmer sells meat, milk, grain, hay, fruits, vegetables, etc., from his farm, or neglects to save and use the manure produced, he removes from his soil a certain amount of potash, phosphoric acid, and nitrogen that must be restored sooner or later if productivity is to be maintained.

A useful table has been compiled showing the amount and value of fertilizing constituents carried away from the soil in different products. We learn from this table that the farmer who sells a ton of hay, for example, sells in this ton of hay fertilizing ingredients which, if purchased in the form of commercial fertilizers, would cost him about \$5.10; that if he sells 2,000 pounds of wheat he sells an amount of nitrogen, phosphoric acid, and potash which it would cost him \$7.91 to replace in his soil in the form of commercial fertilizers. Or, looking at it from a somewhat different standpoint, a farmer who sells, for example, \$10 worth of wheat sells with it about \$2.65 worth of the fertility of his soil. In other words, when he receives his \$10 this amount does not represent the net receipts of the transaction, for he has parted with \$2.65 worth of his capital, that is, of the stored-up fertility of his soil, and if he does not take this into the account he makes the same mistake a merchant would make should he estimate his profits by the amount of cash which he received and neglect to take account of stock.

Benefit from Feeding Stock

If the farmer, instead of selling off his crops, feeds them to live stock on the farm as far as possible, a large proportion of this fertility, as has been shown above, is retained on the farm; and "if the business of stock feeding is carried to the point where feed is purchased in addition to that grown on the farm, a considerable addition may in this way be made to the fertility of the farm at an almost nominal cost, since it is assumed that feed will not be bought, unless its feeding value will at least pay its cost." This system of indirect purchase of fertilizers in feeding stuffs is practiced largely in England and other European countries, and accounts for no small share of the profits of stock raising in those countries.

But it is evident that these advantages will not be secured unless the manure produced is carefully saved and used.

The growing of more leguminous plants, such as beans, peas, clover, lupines, etc., as a means of

increasing the fertility of the soil, is strongly recommended both from theoretical and practical considerations. But the leguminous crop is best utilized when it is fed out on the farm and the manure saved and applied to the soil. The greatest profit is thus secured, and nearly the same fertility is maintained as in green manuring. The farmer should mend his system so that the barnyard manure will be as well cared for as any other farm product. Loss from surface washing, leaching, fermentation, and decay should be guarded against. Then the feeding of richer food will mean richer manure and better and cheaper crops.

Dislike Changing Old Habits

It is hard to persuade the farmer to abandon time-honored practices and adopt methods with which he is unfamiliar. He also hesitates about incurring the necessary expense of building suitable receptacles for the storage of manure, frequently assuming that this is greater than it really is. As the expert quoted above says, "The new idea that the manure should be as carefully preserved from unnecessary waste as any other product of the farm is hard to put in practice, after having for forty years stored the barnyard manure under the eaves upon the steep hillside which forms one border of the running brook."

Management of Manure

Barnyard manure rapidly undergoes change. When practicable to remove the manure and spread it on the field at short intervals the losses of valuable constituents need not be very great, but when the manure must be stored for some time the difficulties of preservation are greatly increased.

Loss of Manure Value

The deterioration of manure results from two chief causes, (a) fermentation, whereby nitrogen, either as ammonia or in the gaseous state, is set free, and (b) weathering or leaching, which involves a loss of the soluble fertilizing constituents. The loss from destructive fermentation may be largely prevented by the use of proper absorbents and by keeping the manure moist and compact. Loss from leaching may be prevented by storage under cover or in watertight pits. Extremes of moisture and temperature are to be avoided, and uniform and moderate fermentation is the object to be sought. To this end it is advisable to mix the manure from the different animals thoroughly in the heap.

Use of Manure

The disposition to be made of the manure of the farm (both fermented and unfermented) must be determined largely by the nature of the crop and soil. Where improvement of the mechanical condition of the soil is the principal object sought, fresh manure is best adapted for this purpose to heavy soils and well-rotted manure to light soils. Where prompt action of the fertilizing constituents is desired, the best results will probably be obtained by applying fresh manure to the light soils, although excessive applications in this case should be avoided on account of the danger of "burning out" of the soil in dry seasons. Fresh manure has a forcing effect, and is better suited to early garden truck, grasses, and forage plants than to plants grown for seed, such as cereals, or to fruits. Direct applications to root crops, such as sugar-beets and potatoes, or to tobacco, often prove injurious. The manure should be spread when carried to the field, and not left in heaps to leach.

The rate of application must be determined by individual circumstances. As a rule it is better to manure lightly and frequently than to apply a large amount at longer intervals.

Composting With Other Material

One of the best ways to utilize barnyard manure is to apply it in connection with such fertilizing materials as supplement its fertilizing constituents. These materials may be either composted with the manure or used separately, except in case of a nitrate, such as nitrate of soda, which should never be composted with barnyard manure on account of danger of denitrification and loss of nitrogen. As is well known, barnyard manure is lacking in its effects, and in many cases need not be applied so frequently as the more soluble and quick-acting superphosphates and potash and nitrogen salts.

MAKE SOIL HOLD MOISTURE

DRY FARMING

HOW PREPARE TOP SOIL

Method of Holding Moisture to Prevent Evaporation

Dry farming, also called arid farming, is the production of crops without irrigation in regions having a limited rainfall. As a rule, where dry farming is practised the annual rainfall ranges from about 8 to 20 inches. There are vast semi-arid areas in the West which cannot be brought under irrigation, and this method of farming is an attempt to utilize some of these lands for other agricultural purposes than mere grazing.

Farming without irrigation was practised in numerous localities by the early settlers, and while in many cases these efforts were successful, in many more they were failures. They demonstrated, however, that under certain conditions dry-land agriculture may be successfully practised.

The experience gained during the last thirty or forty years and the results of the recent work in this connection carried on by several experiment stations and other agencies, indicate that, by means of special methods of cultivation requiring, in some instances, special tools and implements, and by the use of drought-resistant crops and varieties, arid farming may be placed on a much safer basis than heretofore. The fact should not be disregarded, however, that under semi-arid conditions without irrigation crop failures are bound to be much more frequent than in regions of adequate rainfall; and it is generally conceded that, in order to establish a permanent home on the dry lands of the western plains, provision should be made for the irrigation of a small area on which vegetable food for the family and forage for the stock kept may be grown with certainty every year to tide over the seasons of possible crop failures on the unirrigated portion of the farm.

The experts of the Utah Experiment Station have pointed out that the two main problems in dry farming are (1) the absorption and retention of moisture by the soil, and (2) the culture of crops which make satisfactory growth and reach maturity with very little water. The soils of Utah, generally very deep and quite uniform to great depths in chemical and physical properties, are well adapted to dry farming on account of their great moisture-retaining capacity. The station estimates that under ordinary conditions the average annual rainfall of 12 inches can be held in 3 1/2 feet of soil of this description. In this method of farming, therefore, the soil should be treated to facilitate the absorption and retention of as much as possible of the moisture that falls upon it.

Data secured by the station indicate that on the dry farms of the State 750 pounds of water is required to produce 1 pound of dry matter in the plant, while experiments conducted in this country and in Europe show that under humid conditions only about 500 pounds is sufficient for the same purpose. A rainfall of 12 inches amounts to 1,361 tons of water per acre, or a quantity sufficient, if entirely used by the crop, to produce 27 bushels of grain, even on semi-arid lands.

Large areas within the State have an annual precipitation of 12 inches or more. During the summer months the proportion of sunny days reaches 80 per cent, and the average temperature from May to September is about 65° F. The highest average day temperature, which is from 100° to 105° F., occurs

in June and July. Under these climatic conditions dry farming is considered feasible.

The best yield of corn secured on the Utah experimental farms amounted to 25.93 bushels of ear corn and about a ton of stover per acre.

On all these farms fall planting of alfalfa proved a failure, while spring planting produced a stand wherever tried. To obtain a good stand of alfalfa under similar conditions, the Colorado experts recommend plowing the ground early in the season 5 to 8 inches deep, harrowing it until it is well packed, and planting the seed after the ground is thoroughly wet. If a crust has been formed on the surface by the rain, this should be broken up with a light harrowing and the seed then sown broadcast. If a drill is used, the seed should be drilled in as soon as the ground shows dry on top. The sowing may be done at any time, while the ground is in good condition, between May 10 and July 15.

A study of the principles of dry farming made by the Utah Experiment Station indicates that fall plowing is essential for the purpose of opening the soil and permitting the storage of the fall and winter precipitation, and that deep plowing and, in many cases, subsoiling is desirable, as the water is stored deeper and is not so readily driven off by the direct rays of the sun. In general wheat was the most successful crop grown.

On account of the limited quantity of soil moisture thin seeding is recommended, as it was found that sowing from one-half to 1 bushel of wheat per acre gave the best results. Fall sowing is preferred to spring sowing, as the crop beginning its growth in the fall is at a better advantage to make use of the soil moisture.

Experience has shown that sowing broadcast when the surface is dry does not place the seed deep enough in the soil to assure favorable conditions for germination, but that by the use of the press drill this difficulty is largely overcome. Dry farming does not generally produce long straw, and the harvesting for this reason is done with the header.

The main purpose of summer fallow on dry farms is to store the water of two or more seasons in the soil for the production of a crop, and hence this is practiced more frequently where the rainfall is limited than where it is heavier. The Colorado Station gives the following directions for this practice:

"After the snows of winter have melted in the spring plow the ground at least 7 to 8 inches deep. Level this down with the harrow and packer, following this process with a smoothing harrow forming an earth mulch to check evaporation. This mulch should not be too fine, as the winds of the plains will tend to lift the soil or blow the earth mulch entirely away. If possible stir the surface soil from 2 to 4 inches every 10 to 15 days throughout the summer. Allow no crust to form after summer showers, as this will increase the evaporation of the soil moisture."

In addition to the crops noted above, hard corn, sorghum, millet, field peas, brome grass, meadow fescue, and western wheat grass have given good results on the plains. As regards the quantity of water required for maturity, the common field crops are placed in the following ascending order: Corn, potatoes, wheat, barley, field peas, oats, alfalfa, and red clover.

Spray Formulas for Insect Destruction

Paris Green.—Use 5 ounces to 50 gallons of water. Always add 1 pound of fresh burned lime. In small quantities use 1 heaping teaspoonful to 3 gallons of water.

Lead Arsenate.—Use 5 pounds to 50 gallons of water. In small quantities use 1 tablespoonful to 1 gallon of water. Lead arsenate sticks better than Paris green.

Poisoned Bait.—Mix dry 1 peck of bran and 3 tablespoonfuls of Paris green. Moisten the bran with sweetened water. Don't get it too wet. Distribute this in small amounts through your garden for cut-worms.

Hellebore.—Mix 1 part hellebore with 3 parts flour, and keep in closed vessel over night. This

may be used on vegetables or fruits that are about ready for the table. Hellebore may be steeped in water, 1 ounce to 1 quart of water, for spraying.

Contact Poisons.—For Sucking Insects

Lime Sulphur.—Slake 20 pounds of fresh burned lime. Add 15 pounds of sulphur. Boil in 25 gallons of water for one hour. Dilute to make 50 gallons. This is a winter spray only.

Kerosene Emulsion.—Dissolve 1 pound of hard soap in 2 gallons of hot water. Remove from fire and add 4 gallons of kerosene. At once churn violently, until a creamy emulsion is formed. Dilute this with water so as to have

10 per cent of kerosene oil in your spray for summer use, or 15 per cent for winter use.

Tobacco Water.—Cover tobacco stems with hot water. Allow to stand over night. Dilute the resulting liquor with 3 parts of water.

Pyrethrum.—Mix with 3 parts of flour and keep in closed vessel for several hours.

Soap Solution.—Use 1 pound of soap to 5 gallons of water. This will be found excellent for plant lice, scale on house plants, or for any of the soft-bodied insects.

Whale Oil Soap.—For winter use dissolve 2 pounds in 1 gallon of water. For summer use dissolve 1 pound in 4 gallons of water.

SPRAY ORCHARD TREES AVOID WORMY FRUIT

FERTILIZERS AND SPRAYING

SUCCESSFUL FRUIT GROWERS SPRAY FREELY

Among Latest Improvements Is Spraying Fruit Trees

In no department of human endeavor has there been greater advancement made in the last half century than in machinery for increasing the production of food by cultivation of land. Comprising plowing, harrowing, threshing, and culture of crops. But along with improvement in machinery has come knowledge of constituents of soils by which greater crops have been made possible by application of certain ingredients to the soil by which growth of vegetables and fruits have been increased.

It is within the past fifty years that scientists have been giving attention to the chemistry of soils. Within that time they have studied the effect of different manures, and in case of scarcity of animal manures, what could take the place as a substitute. Study and experiment have evolved many fertilizers which materially aid in producing greater yield of crops, while demonstrating that at the very head of all fertilizers stand the animal manures from horses, cattle, hogs, sheep, and poultry.

Among the substitutes are guano made from bird droppings where waterfowl and various birds have roosted on certain islands in the South seas for

thousands of years. Certain stone, known as phosphate rock, and straw of various vegetables known as legumes which highly fertilize the soil when plowed in with the common earth.

Chemists have discovered that plants are susceptible to change from the application of certain materials which they name as follows.

Nitrogen. This is a material which is heavily in the air. Thus the pumpkin vine which comes from a quart of earth, creeps along the ground, and produces several large pumpkins without diminishing the amount of the quart of soil—comes from the air.

Nitrogen is the principal factor in the production of all vegetable growth. Thus, the immense crop of corn that stands on the field, which a short time ago was bare land, without a blade of vegetation, the hay fields, the fruit and grain fields, heavy with the approaching harvest, all attest the wonderful power and accomplishment of nitrogen and other fertilizers.

Phosphates are returned to the soil by adding some form of decayed or burned animal matter.

Commercial Fertilizers

The theory of the use of commercial fertilizers is that crops cannot reach perfection in quality and quantity at the time they are supposed to mature, without plenty of available plant food. If this is not found in the soil or supplied by the barnyard manure, it must be fed to the crops in the form of one of the commercial fertilizers.

A careful study of the present conditions of farming in the United States indicates, however, that as a rule the manure produced on the farm is not sufficient to maintain its fertility, and that the need for artificial supplies is real, though the amount required may be considerably reduced by careful management.

The ordinary methods of grain farming, one-crop farming, market gardening and fruit growing result in the rapid depletion or exhaustion of our fertile soils; hence the need of supplies of plant food from sources outside the farm in order that maximum crops may be produced.

The important points for the farmer to recognize may be summed up as follows:

1. Commercial fertilizers are mainly valuable because they furnish the elements—nitrogen, phosphoric acid, and potash—which serve as food, not as stimulants.

2. The kind of farming in the past and the demands for special products in the present make their use necessary in profitable farming.

3. In order to use them profitably the farmer should know:

(a) That nitrogen, phosphoric acid, and potash are the essential manurial constituents.

(b) That the agricultural value of these constituents depends largely upon their chemical form.

(c) That these forms are contained in specific products of a well-defined character and composition, and may be purchased as such from dealers and manufacturers and may be mixed successfully on the farm.

4. The agricultural value of a fertilizer bears no strict relation to the commercial value; the one is determined by soil, crop, and climatic conditions, the other by market and trade conditions only.

5. The variations in the composition and value of manufactured fertilizers which contain the three essential constituents are due to variations in the character and in the proportion of the materials.

6. The ton basis alone is not a safe guide in the purchase of these commercial fertilizers. Low ton prices mean either low content of good forms of plant food or the use of poorer forms. Fertilizers, high grade both in quality and quantity of plant food, cannot be purchased at a low price per ton.

7. The best fertilizers cannot exert their full effect on soils that are too dry or too wet, too compact, or too porous. They can furnish but one of the conditions of fertility.

8. The kind and amount to use should be determined by the value of the crop grown and its power of acquiring food.

9. A definite system or plan should be adopted in the use of fertilizers; "hit or miss" methods are seldom satisfactory, and frequently very expensive.

ABOUT SPRAYING

Cost of Spraying

Written for Farm and Garden News, by A. C. McLean

The actual cost of my spraying operations in an apple orchard of six hundred trees, approximately twenty-five years old, is about \$240. This is the average cost for the past two seasons—it varies a little each year, but can be taken for a guide. Of course in the localities where labor is cheaper the cost could be much reduced. Our labor here receives \$1.75 per day of nine hours, and we pay \$4 per day for teams.

The cost of material is reckoned on the basis of that bought by our Apple Club. We pay \$6 per barrel for lime-sulphur and 7 cents a pound for arsenate of lead. For the winter application it takes four days with a crew of three men and one team, putting out five tanks of 150 gallons each of solution per day. Itemized cost is as follows:

Man and team, four days, at \$4..... \$16.00
Two men four days, at \$1.75..... 14.00

Gasoline and oil for engine..... 2.50
Lime-sulphur, 6½ barrels..... 55.00

Total..... \$71.50

We make four summer applications—one when the blossom buds show pink, one when they fall (three weeks later), and about a month after this for second brood of codling moth and sooty fungus. It takes three days for each of these applications with a team and three men putting out six tanks per day of 150 gallons each. Cost of these sprayings:

Man and team, three days at \$4..... \$12.00
Two men three days, at \$1.75..... 10.50
Gasoline and oil..... 1.75
Lime-sulphur..... 12.00
Arsenate of lead..... 1.89

Total..... \$38.14

Expense of Spraying

This cost is for each time. The total cost of summer spraying would be \$152.50. Adding to this the cost of our winter application and the wear and tear on spraying rig, \$25 (that is 10 per cent depreciation), the total cost of a year's spraying would be \$249.00. This makes the cost per tree \$0.415. As to the profit derived from spraying, I have never left any trees unsprayed for a test. We are not running an experiment station, and I firmly believe that unsprayed trees are a serious menace as breeding places for insects and fungi, and I think they tend to make the results of spraying less beneficial. From my observation of unsprayed orchards, I should say that spraying is easily worth \$5 per tree, if properly done. In this locality about 50 per cent of apples on unsprayed trees are either wormy or marred with fungus, and the drop is also much heavier, due to codling moth and scab. Again, by spraying you keep

them at it for a longer time they wanted to look for another job. This is a consideration these days, with the scarcity of competent labor.

Another point is to get the work done when it should be. For instance, in spraying for codling moth, the time after the petals fall before the calyx leaves close, when the spraying must be done to be efficient, is often limited to five or six days, and is never over ten days for a given variety. Thus, should a stormy day or two intervene it is almost impossible to get your work done without an efficient power sprayer, unless men at the pump are changed frequently, as this spraying is one that is important to apply at a high pressure to force the spray material into the calyx cup. Again, looking at it from a business standpoint, gasoline is cheaper than labor. Two or three gallons of gasoline and a pint of oil will easily run an engine for a day at a cost of about



Power Sprayer on Ten Acre Orchard.

the foliage of the trees healthy, which greatly increases the size and quality of your fruit.

The benefit of careful spraying was shown by a talk with a neighboring fruit grower who does not spray. The variety of apples mentioned was Smith's Cider, which is a rather low-grade apple. My neighbor received \$1.50 per barrel for his apples on the open market. We are getting \$2.50 at the same time, and our yield on trees of the same age was fully 50 per cent more.

In an orchard of ten acres or more a power sprayer, in my opinion, is a very good investment. The work is not only done on time, but it is done as it ought to be done. It is very difficult to keep up a sufficient pressure on a hand pump to do good work for a considerable length of time—in fact, it is hard work on any hand pump I ever saw to keep over 100 pounds pressure for half a day. We tried using hand pumps, but our men wanted to quit after three or four hours pumping, and if we kept

50 cents. While it is advisable to have a driver who might do the pumping, he loses considerable time in changing jobs, and, besides, the pressure is apt to run down on a hand pump, and it takes time to bring it up again. A driver is desirable either with a power rig or hand pump. With a steady pair of horses the rod men on a power sprayer can drive and do their work without losing any more time than changing from driving to pumping.

Figuring the cost of a power sprayer at about \$250, for which you can buy a very good one, the actual cost for its use should be around \$25 per year. With reasonable care nearly any of the good machines now on the market, made by a reliable firm, should give good service for ten years without much expense for repairs. I firmly believe that a power machine will be worth much more than this to any orchardist with ten acres of apples who wishes to raise first-class fruit.

LOCATED NEAR A CITY

MARKET GARDENING

VEGETABLES THAT SELL BEST

How Manage a Successful Market-Garden Business

An idea of what may be done by market-gardeners near the thriving cities of the Mid-West is shown by a few extracts from an article by H. W. Doyle, in *The Country Gentleman* for June 27, 1914.

A short distance northwest of the city of Topeka, past a fine grove of maples and on a little eminence, lives F. P. Rude, market gardener. Going up the long driveway one catches a glimpse of a tennis court. Mr. Rude has sons, and those sons not only share in the business but enjoy the same pleasures that city boys enjoy. Rounding the house, you soon find yourself in a tidy barnyard with everything arranged neatly in place, all wagons and implements under cover.

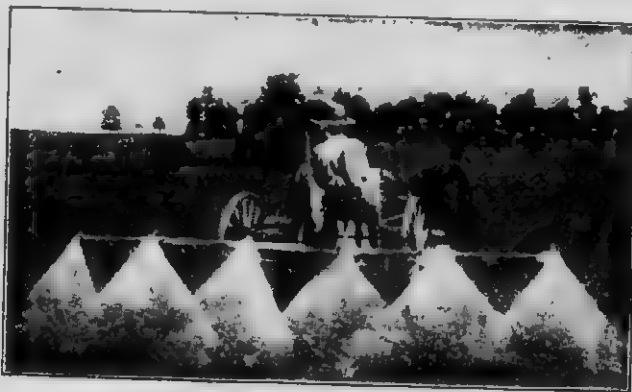
F. P. Rude and Sons farm ninety-three of their one hundred and thirteen acres of Kaw Valley soil—probably as fine a soil as can be found anywhere, varying from a dark brown to a black sandy loam. This makes it possible to suit the crop to the soil. The early crops and sweet potatoes are grown on the lighter soils, the main crops and the cabbages, tomatoes and sweet corn on the darker soils.

Crop.	Acres.	Crop.	Acres.
Carrots	1 1/2	Rhubarb	2
Sweet corn	14	Spinach	4
Cucumbers	1	Squash	4
Egg-plants	1	Tomatoes	5 1/2
Lettuce	1 1/2	Turnips	8
Muskmelons	1/2	Salsify, parsley and	
Watermelons	1/2	miscellaneous	1
Onions	2	Field corn	6
Paranips	8		

These total more than ninety-three acres, but it should be borne in mind that part of the area is occupied by two or more crops a season. The yearly volume of business amounts to something like \$8,100.

Profitable Half-Acre of Hotbeds

From the half-acre devoted to hotbeds comes more profit than from any other like area on the farm. In fact, a considerable part of the income is derived from the sale of cabbage, tomato, egg-plant, pepper,



Spraying the Potato Field Against Insects

The firm does a market-gardening business exclusively, and nearly all the farm, except twenty acres that are rented to nurserymen, is devoted to vegetables. There are two dairy cows, a few pigs for meat, and some pure-bred chickens for eggs, a few of which are sold. Four acres are devoted to alfalfa, and a little fruit is raised for home use. Five acres take in the farmstead, lawns and a small pasture. Occasionally a few acres of field corn are planted. The fodder from sweet corn supplies forage during about four months of each year. All other food and supplies for both man and beast are purchased.

The Rudes grow almost everything in the vegetable line except celery. "No one crop, or even a few crops, except perhaps potatoes, would be profitable under our conditions every year," said Mr. Rude. "It does not pay us to put all our eggs in one basket. Some crops that we find it wise to grow do not pay well in themselves, but they aid materially in selling other more profitable ones. Our customers look to us for a full line of vegetables, and we think it good policy to supply them."

Principal among the vegetables grown are Irish potatoes, cabbages, sweet corn, and sweet potatoes. The annual acreage of the different crops, though they vary somewhat from year to year, are about as follows:

Crop.	Acres.	Crop.	Acres.
Asparagus	2	Peas	3
Beans	4	Peppers	2
Beets	2	Radishes	5
Cabbage	18	Irish potatoes	15
Cauliflower	1	Sweet potatoes	7

and sweet potato plants. The only crop coming to maturity under glass is leaf lettuce, of which a limited quantity is grown.

Hotbeds are started late in January. The heat is furnished by fermenting horse manure, which is obtained in large quantities fresh from the livery stables in the city. The first hotbed crop is lettuce. A little later cabbage and cauliflower plants are started. Then when the lettuce is out of the way, which is in eight or nine weeks, the seeds of tomatoes, egg-plants, and peppers are sown. Finally about 350 bushels of sweet potatoes are bedded. Glass is used as a covering for all the hotbed crops except sweet potato plants, which are covered with muslin.

The capital invested is approximately as follows:

Land and buildings	\$30,000
Sash and frames	1,000
Implement, wagons	2,000
Horses (12 head) and harness	2,000

Total

Mr. Rude believes that a knowledge of markets and marketing has more to do with a truck grower's success than anything else. One has to know the demands of consumers to understand the market.

For thirty years he has toiled away in the Kaw Valley, and he is well-to-do. He started by working for the other fellow, and since striking out for himself his business has grown steadily. One son, who continues in the business, is married and has made a home for himself; the other remains at home.

Surely one must call this success: Health, a competence, and the boys on the farm.

Old and Well Known Fruits. Apples and Peaches

ORCHARD BLESSING

By John G. Whittier

This day two hundred years ago,
The wild grapes by the river's side
And tasteless groundnuts trailing low,
The table of the woods supplied.

Unknown the apple's red and gold,
The blushing tints of peach and pear;
The mirror of the river told
No tale of orchards ripe and rare.

Wild as the fruits he scorned to till,
These vales, the idle Indian trod;
Nor knew the glad creative skill
The joy of him who tills with God.

O painter of the fruits and flowers!
We thank thee for thy wise design,
Whereby these human hands of ours
In Nature's garden work with thine.

Give fools their gold and knaves their power;
Let fortune's bubbles rise and fall;
Who sows a seed or trains a flower,
Or plants a tree, is more than all.

For he who blesses most is blest:
And God and man shall own his worth
Who tills to leave as his bequest
An added beauty to the earth.

FRUIT GROWING

Among the profitable occupations of the American farmer, that of fruit-growing ranks deservedly high. In bygone days the average farmer was not a fruit grower, but the economic and hygienic importance of adding fruit to the products of the farm is now generally recognized, and an orchard or fruit garden is found near almost every farmhouse.

Whether or not the farmer can make money by growing fruit, there can be no doubt that he adds to the health, pleasure and comfort of his family by so doing. It gives a variety of occupation which is welcomed by all who live on a farm. The cultivation of the different kinds of fruit creates pleasant work for the mind, while it adds pleasing variety to manual labor. Aside from the question of profit, the farmer's family should have the benefit of a succession of fruits, large and small. Fruit all the year round is possible on every farm, beginning with the strawberry in late spring or early summer and running through the successive variations of berries, grapes, peaches and other fruits, ending with the late-keeping apples, which disappear with the coming of the strawberry again.

Farmers may either propagate their own fruit trees or obtain them ready for planting from the nurseries. The various processes of propagating fruit trees, vines and shrubs are by seed, layers, budding, and grafting. Growing from seed is chiefly for the purpose of originating new varieties or for raising stocks to be budded or grafted with approved varieties.

Apples

Among the fruits that may well be raised on the farm, the apple is easily the leader. Its numerous varieties are freely grown in almost every State of the Union. Other fruits may be regarded as luxuries, but the apple has become a necessity.

Whether the apple of Eden resembled any modern variety is uncertain, but the British Crabapple is generally regarded by fruit growers as the original of the modern edible kinds. Scientific cultivation has produced innumerable varieties, large and small, and the apple industry is now of considerable importance in several States.

As a rule the apple tree is as hardy as most of our native forest trees and any soil that will produce good crops of grain and potatoes will be found to be adapted to the growth of healthy and vigorous apple trees. The surface of an orchard should preferably be gently rolling, with good surface drainage. But if the farm is entirely level, or made up of steep hillsides, it should still have its apple orchard. Good apples have been grown in orchards of almost every conceivable location and character. When natural advantages are lacking, however, artificial means of preparing the soil must be resorted to. If the surface be entirely level and the soil wet and heavy, the ground should be subsoiled and tile drained.

After a thorough plowing of the land, the apple trees should be carefully set out at the distance apart that is recommended by the nurseryman from whom the stock is secured. The holes should

be dug large, so that the roots will be in a natural position. The trees should be young and of vigorous growth when removed from the nursery rows. If possible they should be planted in the late autumn or very early in the spring. When planting is done in the spring and the ground is dry, the trees should be thoroughly watered once, after which the ground should be mulched with leaves or straw.

Crops Between Apple Trees

Cultivation of the orchard should begin at once after planting. For the first three or four years the plow and the hoe should be freely used and all weeds should be destroyed. Root crops or grass may be grown between the trees. The orchard should be carefully cultivated for several seasons, great care being taken not to injure the roots or bark of the apple trees with the plow.

Apple trees should be pruned sparingly. The heads or tops should be kept sufficiently open to admit sunshine and air. Pruning should be done in the early spring. During the summer much good may be done by cutting or pinching off the newly forming shoots which appear where not wanted. If, however, one grows his own trees from the graft or bud, no pruning is necessary.

Lists of varieties of apples recommended to growers in all the various sections of the United States are published in the reports of the American Pomological Society and can be obtained from the nurserymen. The society has catalogued over 800 varieties of apples grown in the United States and Canada.

Peaches

Peach growing engages the attention of a great many of those who have gone "back to the land" in recent years. Where it is engaged in as a business, the most approved methods of care and cultivation should be studied in advance.

Varities of peaches should be carefully selected, to have them adapted to the soil where they are to be planted. This done, good trees planted on new land with good drainage, and carefully cultivated, will bring quick returns, and are among the most satisfactory fruits that can be grown either for home use or for the market.

The types of peaches are as follows: Persian, commonly planted in the North; Northern Chinese, which includes Elberta and related varieties, generally planted in the cotton-belt; well adapted to western Florida; Spanish, native varieties that have originated in Florida and on the Gulf Coast; adapted to the latitude of northern Florida; Honey, comprising the Honey and its seedlings, adapted to northern Florida, southern Georgia and westward around the Gulf; Peen-to, comprising the original Peen-to and the varieties originated from it; well adapted to Florida, tropical and subtropical regions. Jewel is the most important commercial variety in the group. Oriental Bloods, Red Ceylon, adapted to the same range as Peen-to, and Japan Dwarf Blood to the same territory as the Honey peach.

Oranges and Other Citrus Fruits

There are so many varieties, assigned to districts of wide area, that the best plan for the novice grower is to follow the advice of a reliable nurseryman in choosing varieties to plant. The peach requires a dry, sandy and very rich soil. Slow-growing trees are the hardiest.

Pears

In recent years the pear crop has been bringing splendid returns. There has been a steady upward trend in prices until, even with a short crop occasionally, it pays to grow pears. At prices ranging from six to twelve dollars a barrel it does not take a heavy yield to pay good returns on land planted to this fruit.

The most serious drawback in growing pears is pear blight. But the oriental pears, such as Kieffer, Le Conte, and Garber, are not nearly so subject to it as the European pears. With careful attention to pruning, fertilizing and cultivation, these pears are quite free from blight. This group of oriental pears is the very best for planting, especially in the South. No cultivation should be given more than to cut down the grass and weeds around the trees. The fertilizer used should contain but little nitrogen or ammonia and should be rich in potash. This practice of no cultivation and using potash fertilizer produces hard, firm wood-growth, and such growth is not nearly so subject to injury. It is theappy, vigorous shoots that blight. Dead or blighted branches should be cut out, cutting well below the line between dead and living wood. These prunings should be burned. Attention to these details will go a long way toward making a success of pear-growing.

Plums

Plums have been cultivated from the most ancient times. The best soil is a thick loam. The trees should be planted 20 feet apart and require but little care. They should be thinned out each spring by pruning.

In the extreme South, particularly in central and south Florida, southern Texas, and, in fact, all along the Gulf Coast, the pure-bred Japanese varieties have not been good bearers, consequently, were not generally profitable. But cross-bred varieties—Japanese varieties crossed with native varieties—have proven heavy annual bearers. These cross-bred varieties have made commercial plum growing not only possible, but worthy the attention of fruit-growers even in south Florida and northern Mexico.

Cherries

Cherry trees will thrive in almost any soil. In northern latitudes high fertilizing is not advisable, as rapid-growing trees are in danger of injury from the severe winters. The trees should be planted about 25 feet apart. Very little pruning is necessary. The central leader may be cut back at the time of planting to prevent a high heading of the tree, as a low top is greatly to be preferred.

Oranges

In planting oranges, lemons, and other citrus fruits, three things are of primary importance—soil, climate, and trees.

Good judgment must be exercised in the selection of a location, that the trees may be set in ideal surroundings, for no amount of expense and labor will overcome unsuitable conditions. Prepare the soil well; this is easier done before than after planting.

Location and Good Soil

Having selected a good soil and a suitable location, it is essential that good trees be procured. These should be well grown with clean, smooth trunks, not stunted nor bark-bound, but vigorous, thrifty trees. They should be free from insects and diseases, carefully dug and carefully packed, so as to reach the planter in good condition. Given the right sort of care, and planted properly in well-prepared soil, this is the kind of tree which will give the best results.

Sour Orange Stock Preferred

For general planting in the citrus districts, Sour Orange stock will be found most satisfactory. It

is adapted to a wide range of territory and conditions, but prefers rather heavy soil and a good supply of moisture. Its habit of developing a deep root-system, its thrifty, vigorous growth, its hardiness, its immunity from foot-rot, and its general adaptability to different varieties of citrus fruits, are all strong points in its favor and well worthy of note.

Rough Lemon stock produces a very strong growth of bud placed upon it. It is recommended for plantings on dry soils and in those localities where either lack of moisture or trying soil conditions render the use of Sour stock inadvisable. It is particularly adapted to deep, sandy soils. Most shy-bearing varieties are much more prolific on Rough Lemon stock. It cannot be recommended for the colder sections.

Stock for the Satsuma Orange

Citrus trifoliata is the hardiest species of citrus known in this country. It is deciduous, grows well in the open ground as far north as Washington, D. C., and withstands temperatures of 15 degrees below zero and lower.

It has become of great importance as a stock for citrus trees of all kinds. Varieties budded on it are made harder because of its dormant and hardy character, and the fruit is of exceedingly fine quality, ripening two or three weeks earlier than if budded on other stocks. For the Satsuma orange, it is the only stock to use.

Grapefruit, or Pomelo

Many of the older citrus-fruit growers in Florida can remember when pomelo fruit was not worth picking, in fact, it had no market value. Within twenty-five or thirty years the status of the grapefruit has changed materially, and at this time, it is not too much to say that, from a commercial standpoint, it is equal or superior to the orange. It was discovered, and the Florida product is still considered the standard of quality.

No other citrus tree will outyield the grapefruit in bulk of fruit produced. It is usually considered to be a more vigorous grower than the orange and lemon, and can take care of larger amounts of plant-food to advantage. From the grower's point of view it is a cheaper fruit to pick and pack than the orange. Fewer fruits need be picked and wrapped to fill a box, and the saving in this connection is considerable.

Outlook for Grape Fruit

The outlook for grapefruit in our markets is excellent. It is the breakfast fruit of America per excellence, and its use on the breakfast-table is steadily increasing. No other fruit takes its place, because of its appetizing and refreshing qualities, and once converted to its use, a consumer wants no other fruit. Even should the price per box fall to the level of oranges, it would still be the more profitable fruit to grow, for reasons already pointed out.

In its soil requirements the pomelo, or grapefruit, does not differ from other citrus trees. The trees are grown on the same roots as the orange, and it is the root that governs. It may be pointed out, however, that on account of its large, dense, dark green foliage, the pomelo has the advantage on poorer types of soil, as it is able to prepare a larger amount of food.

The soil should be well drained, and, if it is not naturally drained, this should be provided for by ditching. The surface soil should be good, tillable earth, and if the subsoil contains some clay it will be an advantage in saving plant-food. If a hard layer is present beneath the surface soil, it should be broken up. It is best to clear the land and cultivate it for one season in cowpeas or velvet beans before planting. Such a crop, when plowed under, will do much toward starting the trees into vigorous growth.

How Plant Grape Fruit

Thoroughly plow and harrow the soil to put it in the best possible condition. Stake the ground, setting a lath or other small stake where each tree is to stand. Pomeles on sour orange and rough lemon stock should be set 25 feet by 25 feet, or 25 feet by 30 feet. If on *Citrus trifoliata* stock they may be set 15 feet by 15 feet, or 20 feet by 20 feet.

Lemons and Other Sour Fruits

Have on hand enough commercial fertilizer to allow a pound or a pound and a half to each tree. This fertilizer should analyze four per cent ammonia and five or six per cent each phosphoric acid and potash.

Open the boxes of trees as soon as received, heel-in the trees in a shady place, covering the roots with soil and the tops with the packing material, straw, or a cover of any kind. Dig the holes just in advance of planting. Fill in around the roots with surface soil with which the fertilizer mentioned above has been thoroughly mixed.

In planting, spread out the roots carefully, and pack the soil about them by hand. When the hole is three-quarters filled, add a bucket or two of water, then fill up the rest of the hole. Pack the earth tight about the roots. If the soil is dry it is an advantage to bank up around the trunk to a height of ten or twelve inches with clean, dry soil. This should be removed as soon as the trees start to grow.

Pomelo and other citrus trees may be set out at almost any time, but the best seasons are November to March, and May and June, depending upon soil and weather conditions.

It is the common practice to cultivate the pomelo grove, and with few exceptions it is best to do so. The plan usually followed is to begin cultivation about the time growth starts in spring, and continue to cultivate at intervals of ten days or two weeks until the middle of June or the first of July. If the spring should be dry, cultivation should be thoroughly followed up. After cultivation has been discontinued for the season, the native grasses and weeds may be allowed to spring up and form a cover, or beggarweed may be sown.

The grove on heavy soils may be plowed once each year, in November, but on lighter soils all the necessary cultivation may be given with harrows.

Lemons

The lemon is the most valuable of the acid citrus fruits, and it is probably used in more different ways than any of its relatives. The very high prices secured for lemons raise the question, why should not more lemons be grown for home and local consumption in the southern citrus belt?

While not so hardy as the orange and pomelo, yet lemons can be grown over a wide range of territory. Even in north Florida growers have often been able to produce more fruit than they could use. Certainly no collection of citrus fruits for home use in the citrus belt is complete without a few lemons, and in sections most immune from cold this fruit may be grown in quantity.

Trifoliata

Citrus trifoliata is adapted for planting on alluvial lands, clay lands, soils underlaid with clay and those which naturally contain plenty of moisture or to which water can be applied by irrigation. It should not be planted on high, dry, sandy lands lacking in moisture. On such soils it is a failure.

Seedlings can be used as a hedge, and it forms an impenetrable barrier to man or beast, and, with proper care, can be made rabbit-proof.

Persimmons

Since its introduction into this country in 1875, the Japanese persimmon has been slowly but steadily gaining in favor. Native persimmon seedlings are used as stocks on which to grow the Japanese sorts, hence these latter can be grown on as wide a range of soil as the native persimmon—that is, throughout the cotton-growing belt. The persimmon, or kakia, has been developed by the Japanese until it is the best fruit of Japan and the persimmon takes the place with them of our apple.

They respond generously to good care and cultivation. The fruit keeps and ships well and wherever known in the markets it meets with ready sale.

Soil for Persimmons

The soil on which the Persimmon orchard is set should be well prepared. Old field land may be used, but, if in poor condition, it should be built up before setting the trees. This can best be done by growing a crop of cowpeas or velvet beans on the land and plowing them under previous to planting.

While persimmon trees can be set out at any time between November 15 and March 1 in the lower South, preference in planting should be given to the period from December 1 to February 1.

When and How Set Persimmon Trees

They should be given a distance of 18 to 20 feet apart each way, 134 or 108 trees per acre. Great care should be exercised in setting them, and the roots should not be allowed to become dried out. The tops should be cut back to 2 or 2½ feet on the smaller sizes.

Cultivation during the early portion of the season should be frequent and thorough. This may be discontinued about July 1 or 15, and a cover crop of natural weeds or cowpeas or beggarweed should be allowed to cover the ground. To avoid danger from fire during winter, this should be turned into the soil after it has become dead and dry in autumn. Commercial fertilizers can be used to advantage, and these, with the food supplied by the cover crops, will keep the trees in a thrifty growing condition.

Quince

The quince is so easily grown, so delicious for preserves, and, ripening at a time later than most fruits, affords the busy housewife more leisure to preserve it for a winter luxury, one or more quince bushes, or trees, deserve a place in every garden. It thrives best on a moist soil, and if this is not attainable naturally, a heavy mulching of leaves and rotten wood will answer the purpose.

Of the several varieties of quinces, the apple, or orange quince, is universally liked. The angus is a longer keeper than the orange. The Portugal is a strong tree but unproductive, it makes a good stock on which to graft other varieties. Rea's seedling is larger than the orange and equally good.

If raised in large quantities, the trees should be set twelve feet apart, the ground should be cultivated the first three years after planting, then seeded to clover. Salt should be sprinkled thinly about the trees each spring and stable manure applied each winter.

Guavas

The guava is a sub-tropical fruit and quite hardy. Its range of culture is almost the same as the hardy varieties of the orange. The Cattley guava is the hardiest species. The bushes are very handsome, with rather thick, bright green, shiny leaves. The fruit measures ¾ to 1 inch in diameter or larger. It has a pleasant sub-acid flavor and is very highly esteemed for making jellies and preserves. It is one of the most ornamental of all fruit trees and the plants make handsome lawn specimens.

Kumquats

The kumquat is the smallest of the citrus fruits in general cultivation in this country. Usually the plants are called bushes, for they do not make trees. The plant grows to a height of 10 to 12 feet with a spread of branches about equal to its height. The bright, dark green leaves and deep golden yellow fruits make a very pleasing combination of color. The flowers are small, sweet scented, and appear in June on the shoots produced earlier in the same season. The fruit ripens during the fall and winter, beginning with the month of November. In point of hardness the kumquat ranks with the Satsuma orange. It will withstand temperatures of 15 degrees Fahrenheit and even lower. The bushes are given considerable pruning each season.

Limes

Limes can be put to all the uses for which the lemon is adapted. The flavor is different from that of the lemon, but is highly appreciated by every one who has used the fruit. In tropical countries they are in more general use than lemons.

Lime trees are vigorous growers, and in suitable climates bloom and bear continuously throughout the year. It must be remembered that limes are very tender trees, but they grow well under very adverse conditions.

Pomegranates

The pomegranates are very hardy shrubs which can be grown throughout the Gulf States and the coastal sections of Georgia and the Carolinas. The brilliant scarlet flowers are produced in profusion, and the plants are very prolific. The fruit is used in making jellies, marmalades, and acid drinks. For this latter purpose they are highly esteemed. The fruit has a fresh crispness, delicacy and sprightliness of flavor found in few fruits. The juice-cells surrounding the seeds, the edible part of the fruit, are of a dark ruby or wine color.

Exhibit of Different Varieties of Grapes



GRAPES

How Plant, Cultivate and Grow Them in the United States



In planting grapes be particular to use strong, well-rooted, one or two-year vines. Plant in rows 8 to 9 feet apart, 7 to 8 feet apart in the rows. The soil should be well prepared and enriched. Good drainage is absolutely necessary, for the vines will not thrive in wet soil. For fertilizer, well-rotted stable manure may be used or a heavy application of raw bone meal.

If the soil is naturally poor, give a liberal application of thoroughly rotted stable manure, or raw bone meal, about 400 pounds to the acre, with about 300 pounds muriate of potash, or two tons of good, unleached hardwood ashes. Some planters put manure or fertilizer in the hole when planting, which is recommended, and helps the vines to make a strong, vigorous growth.

Deep and thorough preparation of the soil should be made before the vines are planted. The vines may be trained on a trellis, a grape-arbor or even over a fence, but, of course, the trellis will give the best results so far as the crop is concerned. Pruning is usually practiced in the North in late fall.

Planting Grape Vines

Before planting, the tops should be cut back to within two or three buds of the previous year's growth, and the roots to six to eight inches in length, being kept constantly moist. Spread the roots horizontally in the bottom of the hole, in as nearly a natural position as possible. Cover with good, fine, surface soil two or three inches deep, then step into the hole and firm the earth thoroughly. Now put on your fertilizer, and then fill the hole full, treading it the second time, and finish with sufficient earth to cover the vine, so that only one or two buds will be above the surface. The last filling should not be trodden, but be left loose, to act as mulch. This firming or treading the soil is very essential to success, and should never be neglected.

Cultivation

During the first summer after planting, cultivate the soil thoroughly and hoe frequently about the vines, allowing no weeds to grow. Stirring the ground frequently, especially in dry weather, acts as a stimulant to growth, the finely pulverized soil forming the best kind of mulch.

The red Delaware grape is the standard by which the quality of American grapes is gauged. The berries are small, juicy, sweet and with thin but firm skin. Together with these good qualities it is able to withstand climatic conditions under which other hardy varieties fail and to adapt itself to many soils not suited to most other grapes. It is rightly considered the table grape of unsurpassed excellence. As a wine grape it is among the best, its early maturity insuring a crop, attractiveness in appearance, keeping quality on the vine and in the package, shipping excellence and comparative immunity to black rot make it also a very desirable market berry.

In the southern states, grapes belonging to two separate groups may be grown. These are the Muscadine grapes and the northern bunch grapes. The wine and raisin grapes of Europe are worthless except in dry climates.

Grapes of the Muscadine group are native to the South, and are well adapted to the soil and climate. When compared with the bunch grapes, the fruit-clusters are small, but the fruit is fine flavored and valuable as a table grape, for making unfermented grape-juice, preserves, jellies, and wine. In Virginia and North Carolina they are extensively grown for wine-making.

Muscadine vines are long-lived, reaching a healthy, vigorous old age. They require plenty of space for the best results, and should be planted 15 to 25 feet apart each way. The usual plan is to allow them to run on an overhead trellis, 6 1/2 to 7 feet from the ground. The posts should be heart-pine, cypress, or cedar. The trellis may be made of wood and wire, or of wood alone.

The usual plan, heretofore, has been to allow the Muscadine grapes to grow without pruning, but this is a mistake. It has been shown that, to secure the best results, the vines should be pruned. This is best done in October, immediately after the leaves have fallen. They may also be pruned in summer. Pruning should consist largely in thinning out the vines to admit air and sunlight. Judicious pruning will assist materially in producing more fruit of larger size and better quality.

In the lower South, the northern bunch grapes, while not so thoroughly at home, can be grown to perfection for home use and for local market, when well cultivated, sprayed, and cared for. The leading varieties are Delaware, Diamond, Ives, Moore's Early, and Niagara.

The vines should be planted 8 to 10 feet apart. For the first season or two a post placed at each vine will be sufficient. Later cross-pieces and wires can be added, and the vines allowed to run out over them.

For best results, the bunch grapes must be carefully pruned each winter season. Cut away a woody portion of last season's growth, leaving four or five buds on each shoot. The best spray for the canes and fruit is Bordeaux mixture. This should be applied several times each season, beginning soon after the growth starts in spring. It is also good practice to give an application in winter, just after the pruning is done.

Commercial fertilizer can be used to advantage on all grapes. Stable manure and wood-ashes are also good.

Niagara White Grape

The leading white grape of America is the Niagara white. The bunches are large, handsome, shouldered and compact. The berries are large, round, with thin but tough skin. In all, it presents a very fine appearance. The vine is vigorous and comparatively free from disease, though it responds very well to spraying.

Some of the Well Known Garden Fruits

Conditions for Producing Sure Good Crop.

Some Principles of Garden Planning

1. Rows should run north and south and, if possible, across rather than up and down a slope.
2. Perennial plants should be kept together at one end or side of the garden.
3. The rows should be as long and as continuous as possible, to effect ease and simplicity of cultivation.
4. Plant the tallest crops at the north end of the garden.
5. So arrange the crops as to keep all the ground busy all season.
6. Do not let two crops of similar nature follow one another on the same ground.
7. Keep the plants requiring the same distances between rows together, gradually increasing this distance as you cross the garden.
8. Arrange to raise quick growing crops between the rows of more slowly maturing ones.
9. In the small garden sow a little seed often rather than a large amount at one time.
10. Try to get one planting in just about when the previous sowing is appearing above the ground.



Blackberries

The best soil for blackberries is a strong clay loam that will retain moisture, though the plants will grow and thrive almost anywhere if planted in fertile soil. The plants should be set in rows 5 to 6 feet apart and 3 feet in the rows. The cultivation should be shallow, and three good canes only should be permitted to grow in each hill.



After fruiting cut out the old canes and allow the new growth to come on. Pinch the tips when about 3 feet in height, to make them grow bushy and better able to stand. Sometimes it is necessary to offer support to the canes, and for garden culture a line of chicken wire netting offers a serviceable support, in field culture it is not usual to support the canes in any way.

Gooseberries

The gooseberry is a northern plant, and seldom fruits well south of Maryland except in the high and moist soil. It grows best in a cool climate from 5 to 6 feet apart and 4 feet apart in the rows and cultivated both ways for the first year or two. Little pruning is required and that is mainly to remove stunted shoots and keep up a supply of vigorous new shoots from the base. Spraying with a sulphur mixture will keep down mildew, but mildew may be prevented in a great measure by keeping the head of the plant open and not allowing it to get crowded with shoots that are not needed.

Little cultivation is required other than heavy mulching. This will keep down the weeds and keep the ground in a moist condition.

Currants

There are white, red, and black varieties of currants grown in the fruit garden, the most widely distributed being the red.

The red currants are more particular in regard to soil requirements than most other small fruits. They will grow in sandy soil, but they are not so productive as when set in cool, moist loam. They should be set in rows about 5 to 6 feet apart, and about 4 feet apart in the rows. A half-dozen thrifty shoots will make more and larger fruits than a crowded cluster.

The first season allow three good shoots to grow, and the next spring shorten these slightly if they have made a good growth, thus permitting the new shoots that have started to come up for the second season.

For the first five or six years after setting, a few inches of the new wood, or current year's growth, should be cut off each fall. If this is not done, the result will be a tall, barren stem with but few fruit-buds. No plant will better repay generous treatment and high cultivation than the currant. Two or three forkfuls of good stable manure around each bush every fall is desirable.

If this cannot be readily obtained, an experienced grower recommends the following special fertilizer: Pure ground bone, 500 lbs.; muriate of potash, 250 lbs.; nitrate of soda, 150 lbs. Apply the above, thoroughly mixed, to each acre every spring, sowing it broadcast and cultivating it in.

Crabapples, Olives, Quince and Sunflowers

Crab Apples

The Siberian crab is most used here for jellies; the trees of all species are ornamental aside from their fruit-bearing qualities. The blossoms in the spring are incomparable. The generally accepted theory is that all apples originally sprang from the wild crab apple, and this is indigenous to most parts of temperate United States, so the crab apple is capable of almost universal cultivation. It stands neglect but responds richly to care.

Loganberries

The loganberry is a novelty of recent growth. The vine is an exceedingly strong grower, trailing on the ground like the dewberry. The fruit is rather long, often an inch or more in length, dark red, with the shape of the blackberry and color of a red raspberry, and the flavor a combination of both. It is claimed to be a cross of the blackberry and the raspberry.

Mulberries

The Mulberry can be successfully grown wherever the cherry succeeds. The fruit is well liked by epicures. Three favorite varieties are the Downing, Persian Black, and Persian White. If silk worms are raised the mulberry is an essential to their well-being, since the silk worm is fed on the young leaves of the mulberry tree.

Nectarines

A dry, sandy, very rich soil is preferred by the nectarine, which is of the almond family and comes originally from Persia. It can be grown wherever the peach thrives, its cultivation is the same, and it differs from the peach mainly in having a thin, smooth skin where the peach skin is velvety.

Olives

According to the Italian proverb, "If you would leave a lasting inheritance to your children, plant an olive tree." The tree has been highly esteemed in all ages and both sacred and classical history are filled with references to the olive.

It is a native of Syria and flourishes best in a warm, comparatively dry climate. It will not thrive in a region where the temperature falls below 20 degrees Fahrenheit. It seems especially suited to sandy or loam soils rich in lime and potash. The olive has done so well in California in recent years that Florida and the Gulf states are introducing its culture more and more. The American oils are said to rival those of Aix, France, or Florence, Italy. The olive has been grown in California since the days of the Mission Fathers, having been brought from Spain by the Spanish owners of the land.

The olive tree is a low-branching evergreen, growing from twenty to thirty feet in height. The leaves bear a strong resemblance to those of the willow but are more delicate and of a dusky deep-green or bluish tinge above, silvery beneath. The flowers, as delicate as the leaves, are at first a pale yellow color but, opening, disclose four white petals with yellow centers. The wood is hard, compact, and brittle and is susceptible of a high polish.

The fruit is a berried drupe about the size of a native plum, and "olive-green" in color. The green fruit is used for pickling and from the ripe fruit is extracted the olive-oil of commerce, sometimes called "sweet oil."

Olive oil is coming more and more into use as a table oil, and in America, as elsewhere in the sections where the tree is grown, the oil is rapidly gaining popularity in cooking, taking the place of butter.

A young olive tree will bear fruit when two years old, but rarely pays the expense of cultivation till six years old; it grows slowly and is long-lived.

The tree is easily propagated either by seed, slip, or grafting. When seeds are planted the pits should be removed from the olives and the shell softened by soaking about 24 hours in a lye solution, containing about one-half pound of caustic soda to a gallon of water. If the shells are not thus softened they should be cracked before planting as they are liable to stay in the ground two years before germinating.

Blueberries

The blueberry, called in Ireland bilberry, so delicious when found wild, has been aptly characterized by J. M. Hale, in the Rural New Yorker: "The blueberry proved to be a good deal like Indians—it would not stand civilization, and was never satisfactory, although I monkeyed with it for a period of about ten years." If fortunate enough to have a blueberry patch it is well to let it have its own sweet will, merely keeping it within bounds. A new garden variety is being developed, but as yet it is in an experimental stage.

Figs

No fruit is more valuable in the southern fruit-garden than the fig. They can be closely planted—10 to 12 feet apart—and yield heavily. The fig-canning industry is gradually extending throughout the South, and since several tons of fruit can be produced on an acre of ground, it is well adapted to intensive culture. The preserved product put up at the present time is no wise supplies the demand, and a very material increase in the fig-canning industry is expected.

The fresh fig is also finding its way into the markets, and meeting with a ready sale. Carefully picked at the right stage of maturity and packed in strawberry crates, they can be placed by express in distant markets, four or five hundred miles, or even more, in good condition.

Figs come into bearing very early and for that reason commend themselves to the fruit-grower. With a proper selection of varieties, fruit may be secured from June to November. No other fruit covers so long a summer-fruiting season.

Soja Bean, or Soy Bean

German Coffee Berry, the seed sometimes being parched and ground for use as coffee. Plants grow eighteen inches in height, and are immensely productive, having a small round seed. The plant, being a legume, is valuable as a soil enricher, while the plant and seed make a highly nutritious forage. Row broadcast at rate of one and one-half bushels per acre.

Sunflowers

The sunflower is largely cultivated for its seeds, which make excellent food for cattle, sheep, and poultry. Where largely grown the leaves are used for stock and the stalks for fire-kindling.

Sunflowers grow best on a light, well-drained, well-tilled, and fertile soil. When grown between the rows of potatoes they are planted only every third or fourth row, to avoid shading the potatoes too much, and are thinned to a distance of twenty to twenty-four inches apart.

The seeds may be planted two to four inches deep, in hills three feet apart, in rows three to three and one-half feet apart. If planted in rows, by drilling, the young plants should be thinned, when about ten inches high, to twelve to sixteen inches apart. An acre requires ten to fifteen pounds of seed when planted by the drill method. The seeds may be planted quite early, as they are not injured by slight freezing. The cost of raising a crop of sunflowers is about the same as for corn. The mammoth Russian variety is considered by experts the best variety for oil; single-headed varieties are favored for seed production.

Planted in swampy places the sunflower absorbs miasma and renders the region healthier. In the earlier days of the country there was a saying that where sunflowers grew there was no ague.

When the French explorer, Champlain, arrived in America in 1604 he found the Indians growing sunflowers for the oil. About 1650 the plant was introduced into Europe, where it is widely grown for its seed and oil.

The oil is used for illumination, for wool dressing, in paints, and especially in soap making, but it has not served for lubricating. The cold-pressed oil has found favor for culinary purposes.

The residue or cake remaining after the extraction of the oil is a valuable feeding stuff and can be used for fertilizer. Sunflower seed fed to milch cows has produced good results when fed in the proportion of 4 lbs. ground sunflower seed, 6 lbs. barley, 16 lbs. clover hay, and 20 lbs. silage.

PINEAPPLES

The time at which the main crop in the United States ripens has something to do with the popularity of the pineapple, as it comes into the market after the strawberry has become somewhat common and before the main shipping season for peaches. The main shipping season is from the middle of April to the middle of July.

A considerable area in the United States is adapted to the cultivation of this fruit, and with the increased demand for it there can be no doubt that this will be greatly extended. The State of Florida doubtless contains the largest tract of pineapple land in one body. Southern California has some land that will produce pineapples profitably.

In Hawaii and Porto Rico

All of Porto Rico and the Hawaiian Islands are free from frost, but the soil and climate are not uniformly adapted to the production of this crop. In the Philippines there is more land adapted to the production of pineapples than will be utilized for several generations. Porto Rico is thought to be especially well adapted for the locating of canneries. The pineapple plant will remain alive for months without being in contact with the soil. In contact with moist, loamy soil it soon sickens and dies. It takes about four months from the time of blossoming to the ripening of the fruit. The main season of blossoming is during January and February, though occasionally plants bloom through the entire year.

Gift of America to the World

The discovery of the pineapple, as a fruit, was coincident with the exploration of South America by the Spaniards. As early as the seventeenth century it was cultivated in Holland and in England, but its use was confined to royalty. Outdoor cultivation of pineapples in the United States dates back to 1860, though attempts to grow it in Florida were made earlier.

Soil

The pineapple thrives on a soil from which it would seem impossible for another plant to secure food. This is because of the fact that it is one of the plants that, like the orchids, grow on substances but do not derive nourishment from them.

The proper selection of soil for pineapples is the most important problem in connection with their culture. The requirements of the plant in this respect are so different from the ordinary fruits that it is hard for the would-be pineapple grower to realize that he has here a plant that demands a soil utterly intolerable to the ordinary crops of vegetables. This crop can be grown upon land that will produce ordinary vegetables, but the soil must be of a loose and open nature and not allowed to become water-soaked. It is not the fertility nor the humus in the soil that is detrimental to the pineapple, but it is the want of free drainage. The soil prepared by the gardeners who grow this crop under glass illustrates this point. Their standard formula is about as follows: Two parts decomposed fibrous loam, one part well-decayed manure, another part one-half inch bones and pounded oyster shells. From this it is seen that even where the control over temperature and moisture is the most perfect the texture of the favorite soil is open and decidedly loose. The directions for watering are fully as interesting. "Moderately in winter and freely in summer."

Philippines. In Nihau and the Philippine Islands, where pineapples succeed well, the soil is disintegrated lava covered with a layer of humus. There is but little cohesion in such soils, particularly when, as in this case, they contain considerable lime. When clay is present it is said to be important that it should not be so abundant as to hinder root penetration or to hold the soil water.

In some of the best pineapple plantations of Florida the mechanical analysis of the soil is as follows, the depth of the soil ranging from nothing to six inches: Substance—Moisture in air dried samples, 0.15; organic matter, 1.31; gravel, .28; coarse sand, 8.02; medium sand, 61.11; fine sand, 33.76; very fine sand, .64; silt, .22; fine silt, .06; clay, .50—nearly 97 per cent of sand and gravel.

Now it is that pineapple plants can grow and produce a crop on a soil that seems to be so deficient in the chemical constituents that are necessary for plant growth has not been explained satisfactorily.

Climate

A sub-tropical climate whose temperature never reaches the freezing point is not all that is necessary for pineapple growing. It will rot in an atmosphere continuously saturated with moisture. Pineapple plants may be shipped from the Hawaiian Islands to Florida if they be kept dry. This fact merely indicates that the healthy pineapple plant does not suffer seriously from ordinary dry weather. It is one of the class of plants that prefers an alternating dry and wet season.

Laying Off the Land

After the field has been thoroughly cleared it is laid off into "lands." In extensive fields the lands are about sixty feet wide. This leaves a distance of about thirty feet for the man who, in gathering the crop, breaks the fruit to toss it to the man in the pathway—one side of a land being picked over at a time. The lands should be laid off in various "che ks," 18x22 inches for the smaller varieties up to 48x48 inches for the largest varieties.

The method of planting in beds about fifteen feet wide under sheds has been practiced for a considerable time and is gaining in favor. This allows the laborer to use the shuffle hoe without going between the plants, and also to apply the fertilizer by merely stepping among the plants of the first two rows. It is always necessary to exercise the greatest care in order to avoid breaking the leaves.

Planting

Suckers are planted for the main crop of the common varieties. Slips and crowns take too long to mature a crop to be utilized excepting when suckers are not to be obtained. Well-matured suckers will produce a crop in fourteen to eighteen months from time of setting out. The sucker should be set three to five inches deep, according to size, care being taken not to set it so deep that sand can be easily blown into the bud. Sanded plants are difficult to handle successfully, and it is easier to avoid trouble in this line than to remedy it after it has occurred. To prevent sanding (sand getting into the bud) fill the bud with a mixture of cotton-seed meal and tobacco dust. This will form a solid cake and as the new leaves grow out the plug is lifted and no harm done to the plants. As the dew and rains dissolve the plant food it is carried into the soil and the tobacco dust furnishes insecticide as well as plant food.

Seed is used only for experimental purposes, like originating new varieties. It takes these ten or twelve years to mature a crop.

Best Time to Plant

Time of Planting. Plants may be set out at any time during the year but the best time is during the fall. If set out at this time they will make considerable growth before winter sets in.

If there should be suckers fit to set out during the spring the pineapple grower should not permit an avoidable disturbance at that time, because it is the time of fruiting, when the plants need every advantage possible to produce the finest fruit. Practically the time for setting out pineapple suckers is limited to the season from July to November.

Cultivation

In the sandy region of south Florida very little attention is directed toward the matter of cultivating after the field has been set out. This is by no means due to indifference or carelessness, but rather to the result of years of experience.

Cultivation as it is now practiced consists in agitating the surface of the soil to the depth of about an inch with a shuffle hoe three or four times a year. Some planters hoe the pines as often as once

Pineapples in Warm Regions

a month. The roots of the plants do not penetrate the soil deeply. The soil is made up of so large a per cent of sand that it cannot bake or form a hard crust.

In Porto Rico, Hawaii, and the Philippine Islands a different class of soil is utilized for producing pineapples, and more attention must be given to the cultivation of this crop. In all of these sections pineapple growing is still undeveloped, and consequently the cultivation varied and often indifferent.

Avoid Breaking the Leaves. During the growing season, the leaves of the pineapple plant are very easily broken. The peculiar and complicated structure of the pineapple leaf makes it very resistant to drought, but if the outer skin is broken it soon loses moisture to an excessive extent, and damage to the plant results. Whatever implements are used or whatever operations are performed in the field, special care must be exercised to avoid breaking

Pineapple Sheds

For thirty years growers have practiced the use of a sort of a protection built on posts in the form of an elevated platform and covered with palm (palmetto) leaves to protect pineapples against cold. It was discovered that the pineapples grown in partial shade were more tender and juicy than those grown in the open. The desire to protect this plant from the winter's cold seems to have been the origin of our present pineapple sheds, though the protecting of pineapples by sheds has now extended to the region where there is little danger of freezing. The value of the half-shade condition in improving the quality of the fruit is now so generally recognized that this is the important consideration for many for building sheds. The cover should not be less than six and one-half feet from the ground, and it is preferable to have about seven feet in the clear. If plastering laths are used the cover may be six inches lower than when boards are used.

Trees for Shade. Growers have discovered the beneficial effect from the presence of cabbage palmettos, which not only seem to protect the pineapple plants from the cold of winter, but to be an advantage to the crop in the summer. Its native haunts appear to be in the shade of dry forests in some of the tropical countries of America.

Pineapple Fibre

The plant after maturing a fruit gives rise to one or more suckers and later in the season dies, to remain in the field where it is beneficial, as it forms a slight covering as a mulch, but during the dry season it may become a source of danger from accidental fires.

Growers are learning that these leaves may be put to a more profitable use. The fibre yields readily to machine manipulation and comes out white and clean without washing by simply drying in the sun after being extracted. There are said to be about sixty pounds of fibre in a ton of green leaves—about double the amount in a ton of green family stalks. The fibre has many qualities that give it superior merit, and is used in the textile industry.

Many of the soldiers serving in the Philippines and travelers in the Orient have brought home beautiful embroideries worked on pineapple cloth.

Gathering

It is an unusual experience for the agriculturist that is necessary to bring a crop to the market, and here it all or in part for the want of proper handling at the time of gathering. It is necessary to pay the closest attention to details in gathering. This is the operation in which judgment plays the most important part. It cannot be learned except by experience.

The Fruit Should Be Dry When Gathered. After that, care in handling, care, and more care is the watchword. The pineapple, though enduring the most trying conditions of temperature and rough handling as long as the skin remains unbroken, deteriorates rapidly after the slightest break.

Ordinarily there are but two grades, fruits and culls, but besides the culls the grower has often three grades on his hands: Ripes, greens, and mediums.

In sizing, the fruit is known by the number it requires to fill a half barrel crate, viz: 18's, 24's, 30's, 36's, 42's, 48's, and 64's. The last-named size is not crated unless the crop is very short.

Starting Without Capital

To produce good fruit, such as is demanded by the fancy markets, the cost per acre cannot be reduced below \$100. If the soil be fertile enough to grow a crop without fertilizer the cost of clearing will be greatly decreased. From the figures here given it will be seen that it requires considerable capital to grow pineapples extensively.

The Outlay per Acre

Cost of land.....	\$ 150 to \$ 800 00
Cost of clearing.....	20 00 80 00
Cost of plants.....	25 00 300 00
Fee fertilizer.....	20 00 150 00
Freight, express, etc.....	20 00 80 00
Labor.....	25 00 75 00
Shed.....	325 00 600 00

Total.....\$430 50 \$1,845 00

This estimate does not include the salary of the superintendent.

The figures seem almost prohibitive to many farmers, but it has been demonstrated repeatedly that a willing laborer may become a pineapple grower. The absolute outlay in money may be reduced to the cost of the plants, the cost of the fertilizer, and the cost of the land. This puts the cost for the first year at about \$50, and to carry this forward to the ripening of the first crop about \$20 more should be added, making an outlay of \$70 to produce the first crop on an acre. In the pineapple-growing section of Florida there is sufficient demand for labor to more than keep a man while he is growing his first crop. Another plan adopted is for two persons to form a partnership, one working to supply the needed cash while the other grows the crop of pineapples. After the first crop has been produced the increase in the number of plants will permit the extension of the area as rapidly as financial conditions will allow.

BANANAS

The banana is produced only in sub-tropical America, the Canal Zone, the Philippines, etc. It is an herbaceous plant with an underground stem, the apparent stem, which sometimes attains a height of thirty feet, is only the sheath of the leaves, closely compacted. The leaves themselves are six to ten feet long and one more broad.

The fruit is 4 to 10 or 12 inches long and 1 inch or more in diameter. It grows in large bunches

weighing often from 40 to 80 pounds. The pulp is soft and of a luscious taste. When ripe, it is eaten raw or fried in slices. The banana is grown only in a warm, tropical or sub-tropical climate and is an important article of food.

It requires a rich soil with a large amount of moisture. It is propagated by cuttings, known as suckers. It gives an enormous yield per acre.

PAPAWS

The name is applied to two different kinds of fruit, one purely tropical, the other North American and especially belonging to the middle states. While it grows in warm climates, as a tree, 20 and 30 feet high, in the northern states it is a shrub. The fruit, ripening usually in September, is 3 or 4 inches long and about a third as thick, with tender yellow skin when quite ripe. The fruit is considered too sweet by many, while some prefer it to the banana.

In warm climates, adapted to its growth, the fruit grows as a berry about 10 inches long and

half as broad and is of a dull orange color. It is sometimes eaten raw with pepper and sugar, but is more generally cooked with sugar and lemon juice. The unripe fruit is boiled and eaten as a vegetable and is also pickled. The juice of the ripe fruit is said to be used as a cosmetic to remove freckles and that of the green fruit is a remarkably efficient vermifuge. The leaves are used in the French West Indies as a substitute for soap in washing linen. Cultivated as a shrub in rich soil.

Variety of Farm and Garden Production

Broomcorn

The soil should be plowed in the fall or as early in the spring as possible, so that it will retain moisture. The land should be disked and harrowed about two weeks before planting, and after planting requires repeated cultivation to keep down weeds. The plants are tender and grow most rapidly in warm weather, not standing the early spring cold as corn will. Great care must be exercised in the selection of seed; one bushel of seed will plant about twenty acres. Broomcorn is a good sod crop. Two good varieties are the Dwarf and the Standard; the former grows only about six inches high with a brush from twelve to twenty inches; the Standard must be bent in order to make the heads easier to cut. Broomcorn demands prompt attention when it is ready to harvest, as it will not stand in the field without great damage. It must be cured in sheds in order to retain its green color. The price per ton ranges from \$50 for the lower grades that have been damaged by weather, to over \$200 for the superfine grades.

Cranberries

Swampy ground on the farm can be made very profitable by the cultivation of cranberries. The berry is a native of the colder regions of the Northern Hemisphere and grows as far south as Virginia. It is cultivated in twenty of the States. The yield is a million bushels a year, half of this coming from Massachusetts. Low, moist ground forms the cranberry bog. It should be planted in hills 18 inches apart and 6 inches apart in the rows. A thick coating of swamp muck may be applied with benefit before planting. The cranberry marsh should be kept free from weeds, grass, and moss, as clean, well-drained, and sanded bog renders the crop less liable to injury by frost. In case of berries rotting, the bog is generally found to contain less clay and silt (and iron), and more nitrogen than necessary. Potash and phosphoric acid applied to the soil, with some lime, will generally correct this. The berries should be picked late in September or early October and should not be picked in a wet condition nor stored in a moist place.

The cranberry has a very high keeping quality if reasonably cared for.

Apricots

A fruit of the plum genus which was introduced into Europe from Asia more than three centuries before Christ, and into England in the first half of the 16th century. It is a native of Armenia and other parts of Asia and also of Africa. The apricot is a low tree of rather crooked growth, with somewhat heart shaped leaves and sessile flowers. The fruit is sweet, more or less juicy, of a yellowish color about the size of the peach and resembling it in delicacy of flavor. The wood is coarsely grained and soft. Apricot trees are chiefly raised against walls and are propagated by budding and grafting. Its care and cultivation is the same as the peach, the crown gall, produced by a small parasitic organism, being the same disease which afflicts the peach, is liable to attack the apricot. As with the peach, there is no cure. The only remedy is to dig up and destroy the trees.

Dewberries

The dewberry is a species of low blackberry plant. The fruit ripens both before and after the blackberry varieties and is much grown for market. Do not plant dewberries on too rich garden soil, as they go too much to vine, with a corresponding loss of fruit. For fertilizer use a small percentage of ammonia and a large percentage of potash. The plants may be set in rows 5 to 6 feet apart and about 3 feet in the row.

Some growers let their dewberries trail on the ground and keep the vines cut back to 3 or 3 feet in length; but much better results are obtained if the vines are given some support, either by trellis or by stakes driven between every alternate hill, tying one hill from each side to the top of the stake, which should be notched at the top to prevent slipping down. Cut off all surplus vines 18 inches beyond where tied.

Emmer

Emmer is a sub-species of wheat, cultivated in regions of little rainfall, under the name of spelt. It is valuable as a hardy forage plant.

Raspberries

Raspberries are divided into three general classes: The reds, blacks, and purples. The red raspberries thrive best in a strong soil which is inclined to hold the moisture. They have been grown successfully on sandy soil when highly cultivated and liberally manured with stable manure so that the moisture may be retained. It is customary to set the plants in rows 6 feet apart and about 3 feet in the row; but, in highly fertilized soil, it may be necessary to give a little more space between the rows.

The best fertilizer is well-rotted stable manure, but if this cannot be obtained, a high-grade commercial fertilizer may be freely used. Bone meal seems to be especially suited to the needs of the plants.

Clean cultivation through the whole season is especially important, and the cultivator should be set rather high so as to prevent the formation of too many suckers. In cold climates it may be necessary to protect the canes in winter, and the simplest plan is to bend them down along the row and cover with soil. This can be done late in the fall.

Black raspberries should be planted in rows 5 to 6 feet apart, and 3 1/2 to 4 feet apart in the rows. They are more hardy than the red raspberries and seldom need winter protection. The ends of the long canes should be pinched back to promote the production of side shoots and an increased crop of fruit.

The cultural directions for the other class will apply equally well to purple raspberries; but the canes need not be pinched back in the spring. They are very vigorous and, if permitted to grow, will often produce a good crop when both the red and black varieties fail.

Gherkin

The burr, or gherkin, is a distinct species of cucumber which comes from the West Indies. It is used exclusively for pickling. It is very small, two to three inches in length. The vines should be planted five feet apart, and cultivated as other cucumbers.

Hemp

The region for hemp growing in the United States is comparatively limited. It is raised here for its fibre used in making ropes and also as strong warp for carpets. Any soil adapted to corn can be used for growing hemp. It is sown broadcast and is ready to harvest in a trifle over three months. It is cut by hand in the same manner corn is cut. If retted or rotted by the dew or rains where it lies on the ground, the fibre is gray and harsh. If retted in water the fibre is soft, lustrous, and creamy white. It is a most exhaustive crop, unless the waste products are returned to the soil. Four to six pecks of seed to the acre is the amount usually sown if a crop of fibre is desired. If grown for hempsed it should be planted like corn, using half the amount of seed.

Horseradish

No more profitable market-garden crop can be found, as a second crop, than horseradish. It is a hardy plant, makes its main growth in the fall, and usually need not be dug until December. To secure roots for planting, all small roots are broken off of the main root when it is prepared for market in the winter. The rootlets, or sets, should be cut in pieces about five inches in length and a quarter to half inch in diameter. If the top end is cut square and the root end planing it will guide one in planting to insure the right end being placed up, permost in the ground, developing a more symmetrical root. The sets may be tied in bundles and stored in a cool cellar or pitted in the open ground. Early in May the horseradish sets may be planted between the rows of early cabbage or beets, placing the top of the set two or three inches under the surface of the soil, so that it may not come up until after the cabbage has been harvested.

TABLES OF WEIGHTS, MEASURES, WOODS, HEAT, COLD, WAGES, Etc.

Value of Indian Meal.

As a food, 100 pounds of Indian meal is equal to the following:

Name of Article	Amount in Pounds
White Turnips	1,200
Beets	800
Cabbage	700
Carrots	700
Rye Straw	600
Rata Bagas	600
Wheat Straw	500
Oat Straw	400
Corn Stalks	333
Timothy Hay	300
Barley	111
Rye	60
Oats	60
Wheat	75
Beans	60
Oil Cake	40

Decay of Stumps.

Kind of Stump	Time of Decay in Years
Pine	200
Cedar	9 to 18
Hemlock	10 to 15
Spruce	7 to 14
Hickory	6 to 10
Maple	5 to 18
Oak	5 to 8
Ash	5 to 8

Weight of Lumber.

Different kinds of seasoned lumber contain the following number of pounds in 1,000 feet.

Kind of Lumber	Pounds
Pitch Pine	4,150
Maple	4,000
Beech	4,000
Hickory	3,900
Locust	3,800
Dogwood	3,900
Cherry	3,720
Walnut	3,690
Oak	3,675
Ash	3,550
Cypress	3,350
Elm	3,220
Chertnut	3,170
Red Pine	3,075
Poplar	3,056
Birch	2,850
Cedar	2,925
Yellow Pine	2,800
White Pine	2,800
Willow	2,780
Norway Spruce	2,670
Hemlock	2,350
Butternut	1,900

Per Cent. of Sweet.

Name of Article	Per cent of Sweet
Sugar Cane	18
Sugar Beet	10
Sorghum	9½
Corn in Tassel	3¼
Maple Sap	2¾

Lumber Required

To build a mile of board fence, ordinary width of board:

1 board high	2,940 feet
2 boards	5,280 "
3 "	7,920 "
4 "	10,560 "
5 "	13,200 "

Pounds Per Acre.

The following is about the number of pounds of each which may be grown on an acre.

Name	Pounds Per Acre
Mangel Wurzel	22,100
Parsnips	11,100
Cabbage	10,800
Turnips	8,500
Apples	8,300
Potatoes	7,600
Carrots	6,800
Pears	5,100
Hay	4,000
Onions	2,700
Cherries	2,000
Plums	2,100
Beans	2,200
Peas	1,900
Oats	1,800
Barley	1,650
Wheat	1,300
Hope	400

Age Attained by Birds.

Name of Bird	Age Attained in Years
Heron	50
Pelican	50
Sparrow Hawk	40
Skyhawk	30
Crane	24
Linnet	23
Nightingale	18
Lark	18
Blackcap	15
Goldfinch	15
Partridge	15
Pheasant	15
Robin	12
Blackbird	12
Thrush	10
Wren	3

Constituents of Milk.

Of 1,000 parts of milk there are various constituent substances as follows.

Constituents	Number
Water	840
Milk-Sugar	45
Butter	40
Casein	40
Phosphate of Lime	17
Chloride Potassium	15
Phosphate Magnesia	4
Free Soda	15
Common Salt	9

A Quartette of the Newer Fruits

Alligator Pear

The alligator pear, also known as aguacate, avocado, midshipman's butter, etc., is the fruit of a tree native to tropical America, but now widely grown throughout tropical countries. There is an increasing production of this fruit in southern Florida, both on the mainland and the Keys; also in the milder regions of southern California. The West Indian type, which is the only one found in the markets of eastern United States, yields a fruit about the size of the largest pears. The varieties differ considerably in form, and range from deep purple to light green in color. Generally speaking, they are unlike a medium-sized egg-plant fruit in form and appearance. The portion eaten is a pulp which surrounds a single large seed. In texture the pulp is soft and somewhat like butter, and is perhaps most commonly used for salad making. The Mexican type of alligator pear, which is now grown in California and Florida, is a smaller tree and yields a much smaller fruit. It is, however, reported to endure several degrees of frost, whereas the West Indian

type is injured by a temperature of 32 degrees Fahrenheit. The average weight of the avocados is about three-fourths pound each. The edible portion or pulp constitutes on an average 71 per cent, the seed 20 per cent, and the skin 9 per cent of the entire fruit.

Peen-to Peaches

The Peen-to peach belongs to a group of peaches that is essentially adapted to sub-tropical conditions. The group is limited in its adaptations in this country to the States of Florida, Louisiana, Mississippi, Alabama, and the coast regions of Texas. It seems especially suited to Florida conditions, and is therefore of unusual value to that State, since the varieties of peaches which flourish in orchards farther north are nearly always failures when grown in Florida.

Roselle

The roselle is the fruit of Hibiscus sabdariffa, a widely distributed tropical plant, which yields the roselle fiber of commerce. As grown in Florida and California it is an herbaceous an-

nual. The plants are grown from seed in spring, and require a long season free from frost to mature. Under favorable conditions they produce a very heavy, continuous crop of blossoms in the latter part of the summer and autumn. The fruits, which somewhat resemble okra or gumbo in form, though they are much shorter in proportion to their size, are a dark, magenta red in color and are used for making jellies and preserves, which are of a beautiful red color and have a flavor suggesting that of the cranberry. The roselle may be grown in conditions where the ordinary hibiscus flourishes.

Surinam Cherry

The Surinam cherry, sometimes called pitanga, is the fruit of a tropical shrub, native to Brazil and other tropical regions of South America. This shrub, which attains a height of about 20 feet, is grown to a limited extent in southern Florida and southern California. The fruit is about the size of an ordinary cherry, is roundish oblate in form, ribbed, bright red in color, and of a sharp but pleasant acid flavor. It is somewhat used for domestic jelly making.

Angora Goats

The raising of Angora goats has become one of the distinctive industries of Texas, where it is found most profitable. In Iowa and other States this goat is introduced on land to be cleared, as it will clean up all underbrush and shrubbery in two years.

Average Period of Incubation

Chickens	20-23 days
Geese	28-34 days
Ducks	28 days
Turkeys	27-29 days
Guinea fowls	28 days
Pheasants	25 days
Ostriches	40-45 days

Plant One Acre

Currents and Gooseberries	
6 by 2 feet apart	2,420
6 by 4 feet apart	1,515
Raspberries and Blackberries	
6 by 3 feet apart	2,420
7 by 2 feet apart	2,075
Strawberries	
2 by 1½ feet apart	9,655
3½ by 1½ feet apart	8,260

The Most Profitable Berry Plant

STRAWBERRIES

How to Plant Cultivate And Grow Them

Of all the small fruits the strawberry is probably of the greatest commercial importance in this country.

During early Colonial days the wild strawberries of the field were abundant in North America and furnished a much-prized article of diet. Later on the plants were transplanted to the garden and under cultivation gave fruits of increased size.

The garden strawberries now so common in this country have come chiefly from the so-called Pine type of berries, imported plants of this type having been crossed with native American berries. The Pine type sprang from *Fragaria chilensis*, a plant originally introduced into Europe from Chile, but now known to be native to the western mountain regions of both North and South America. The first native strawberries to be brought under cultivation, however, were those of eastern North America, which belong to the scarlet class, the species being known to botanists as *Fragaria virginiana*.

The garden strawberry is an American product which adapts itself to a wider range of latitude than any other cultivated fruit. It is universally liked as well as commercially important. As it will grow on almost any soil and is easily cultivated, no farm should be without its strawberry patch.

Many growers find the strawberry a very attractive subject for the propagation of new varieties. It is a plant which is readily propagated by seeds, which is, of course, the only means of securing new forms. And, fortunately for the breeder, the strawberry is provided with a means of self-preservation through the agency of stolons, or runners, which enables the grower to propagate any plant he may develop.

The commercial propagation of the strawberry naturally proceeds along two lines: (1) The production of standard and novel sorts in large numbers to be sold to local or distant purchasers; and (2) the production of a few standard kinds for the fruit crop.

In the first instance fruit production is only a side issue. The main crop is the plants. The aim is to get these as large and strong as possible, and to this end the ground is made rich and put in good tilth by frequent cultivation early in the season.

The home production of runners for one's own planting is another matter; here the fruit crop is the chief object and the production of runners prior to harvesting the fruit is discouraged. The difficulty with this method is to secure strong, well-developed plants for August and September planting. When the main planting is done in the spring the earliness of the plants is of less importance. In favorable seasons, however, strong plants for August and September planting can be secured even in the New England states.

When to Set the Plants

Field practices in the cultivation of strawberries vary in different sections of the country to conform to climatic and soil conditions. The factor most influenced by conditions of soil and climate is the time of setting. In some sections the rainfall will permit of either spring or autumn planting, while in other equally good strawberry-producing regions, plants can only be successfully set during the fall. The demands of the market also influence the date of field planting.

The land to be devoted to the growing of strawberries should, if possible, be planted in a cultivated crop, such as potatoes, beans, or corn, at least one year previous to setting the plants, in order that the larvae of such insects as wireworms, white grubs, cutworms, etc., may be as completely eliminated as possible. Sod land is a favorite breeding ground for such insects, and should therefore be avoided unless it be new clover sod, which can be turned under with good results.

In general there are only two seasons for planting—spring and fall—but in some localities spring planting should be done in April or May by the use of the preceding season's plants, while in others



Sample Strawberry

it may be done in June from the crop of runners of the same season.

In irrigated regions planting can be done at whatever season the work will give best results in future crop production. In humid regions rainfall is a determining factor.

Suggestions for Planting

There is no plant that adapts itself so well as the strawberry to all conditions and to all sorts of soil, whether loam, sand or clay. Good drainage is absolutely essential, but the plants should have a reasonable amount of moisture.

Avoid setting the plants in land that has been for a long time in grass, for in such places you will find the larvae of the May beetle, which are extremely destructive to small plants. The soil cannot be made too fertile, and the richer it is made, and the more humus you can get into it, the better will be the crop. Stable manure is probably the best fertilizer that can be used, although there is an objection on account of the grass seeds which may be brought in. If commercial fertilizer is used it can be made at home, and the following formula is probably the best: Acid phosphate (18 per cent), 500 lbs.; nitrate of soda, 100 lbs.; mah-scrap, 500 lbs.; sulphate of potash, 400 lbs. This will make a ton. This fertilizer should be applied broadcast and worked well into the soil before plants are set, or applied as a top-dressing and worked into the soil after the plants have started to grow. Don't put directly under the plants when setting, as thousands upon thousands of strawberry plants have been killed in this way.

Depth to Set the Plants

No plant which the gardener has to handle is more exacting in regard to depth of planting than the strawberry. As the plant is practically stemless, the base of the leaves and the roots being so close together, care is required to avoid setting the plant so deep that the terminal bud will be covered or so shallow that the upper portion of the roots will be exposed, either being a disadvantage which frequently results in the death of the plant.

System of Planting

There are two general systems of planting strawberries. In the first the plants are set in hills and can be cultivated in both directions; the other allows more freedom and the plants spread and form a broad belt or row called a "matted rowberry." In the hill system of culture the strawberry plants are set singly either 3 by 2 feet apart, or with the rows 4 feet apart and the plants 2 feet apart in the row, depending upon the character of the soil and the length of time the plantation is to be maintained.

In Florida a common practice is to lay the land off in broad beds 8 to 12 feet wide, the rows of plants to run lengthwise of the beds, the rows 23 inches apart, with the plants 18 inches apart in the rows. Such beds afford sufficient drainage and hold the mulch better than narrow beds or raised rows, and the space between the plants admits light to all sides of the plant, which is an

Protect Strawberries in Winter

advantage in coloring the fruits. The hill system raises the plant somewhat and admits of more intensive cultivation than does the matted row.

Planting in Matted Rows

In order to maintain a belt of plants 12 to 18 inches wide (a convenient width), and still have space between the belts for cultivation and the other operations necessary to the successful management of a plantation, the rows a planting time should be much farther apart than is necessary with the hill system.

A common practice is to set the plants in single rows 4 feet apart, with the plants 12 inches apart in the row. The runners which develop from these plants are then allowed to take possession of the area for 8 to 9 inches on either side of the original plants, thus making a matted row 12 to 18 inches wide; this leaves 30 inches between the rows, which allows ample space for cultivation and gathering the fruit. This space can be reduced from 30 inches to as little as 18 inches where land is valuable and it is necessary to secure maximum returns; on thin soil, however, the greater distance is most satisfactory.

There is one advantage in the narrow cultivated space. After the second crop has been harvested the runners can be allowed to take possession of the cultivated middle, and when the young plants become thoroughly established the original rows can be broken up with a narrow turning plow or sharp cultivator. In this way a patch can be very satisfactorily and cheaply renewed and by the liberal use of suitable fertilizers the rotation can be kept up on the same soil for several years.

Some planters prefer to set the plants for the matted row in a double row at planting time. The practice is to establish two rows 12 inches apart, 6 inches on each side of the center of the matted belt, setting the plants 2 feet apart in each row and alternating the plants in the row, so that the plants actually stand a little over a foot apart.

Cultivation

Clean and shallow culture are the watchwords of successful cultivation. Growers have come to realize that cultivation means more than the destruction of weeds. Cultivation has a beneficial influence upon the soil by loosening it and making it more easily penetrated by moisture in the form of rain or dew. A better stand of plants can be maintained during a dry period on well-tilled ground than upon ground that is poorly cultivated.

Mulching

Covering the surface of the soil with dead or decaying vegetable matter is the meaning of the term mulching as here used.

Mulching in strawberry culture serves different purposes, depending upon the locality in which the plants are grown. A mulch acts as a protection from cold, prevents freezing and thawing and the consequent lifting of the plants ("heaving out"); it retards growth in cold regions by shading the crowns and maintaining a low soil temperature longer than in soil not mulched; it acts as a conservator of moisture, discourages weed growth by smothering the young seedling, and finally protects the fruit from contact with the soil.

The materials which can be used in mulching are various, but their value depends largely upon their freedom from weed seeds and their fitness to protect the plants without smothering them. Whole or cut straw free from grains, straw manure from the horse stable, and pine straw from the forest are among the more common mulching materials. In certain sections marsh hay, either from fresh or salt water marshes, is a common and very satisfactory mulching material.

Protect in Winter

It is advisable in the middle states and in the North in general to protect the plants in winter. A mulch in the late fall should be applied, just enough to cover the crowns of the plants. With the earliest start of the leaves in the spring, the mulch should be pulled back from the plants and left on the beds to keep the fruit clean. After the mulch is off, and before the fruiting season, keep a sharp lookout for weeds that will start in the rows. After the plants have fruited, the space between the rows should be cultivated to prevent evaporation of moisture, keep the plants growing, and kill weed growth. And this loose mulch should be maintained through the remainder of the season.

The varieties of strawberries best adapted to any particular locality can be readily ascertained by inquiry of the nurserymen who supply strawberry plants. The question of the adaptability of varieties for the various fruit sections of the United States has been carefully worked out by the experts of the American Pomological Society and their recommendations can be easily secured by anyone desiring to grow strawberries on a commercial basis.

The government is making extensive experiments at Sitka as to the strawberries which flourish best in Alaska.

VARIOUS FERTILIZERS

Pure Animal Manures—Pulverized

Convenient, compact, high grade natural manures dried and ground or pulverized, very nutritious, immediate and lasting in effect. Excellent for mixing with the soil for plants. In the vegetable garden they promote a rapid, steady growth until maturity. They make a rich Liquid Manure.

Quantity Required. For garden and field crops, 1 to 2 tons per acre— $\frac{1}{4}$ before plowing; the balance before harrowing. For top-dressing grass, use 1 ton per acre, applied in fall or early spring.

Sheep Manure Pulverized. Price, 50 lb. bag, \$1.25; 100 lb. bag, \$2.00; per ton of 2,000 lbs., \$35.00; in packages of 2 lbs., 15c. (P. P. 34 lb.); 5 lbs., 30c. (P. P. 54 lb.); 10 lbs., 50c. (P. P. 11 lb.).

Horse Manure Dried and Ground. Price, per 100 lb. bag, \$2.50; 500 lbs., \$10.00; per ton of 2,000 lbs., \$35.00.

Ashes—Canada Hard Wood

Drives away insects and improves the texture of the soil; indispensable for all crops requiring potash; very beneficial for garden and field crops, grass lands and lawns. (Guaranteed Analysis.)—Total Potash, 15%; total Phosphoric Acid, 1 to 3%. Apply 1 to 2 tons per acre, as one heavy application is better than the same quantity put on in fractions.

Price per bbl. of about 200 lbs., \$2.75; per ton of 2,000 lbs., in bbls., \$25.00. Special prices in bulk.

Nitrate of Soda

Valuable solely for the nitrogen it contains. It is chiefly a stimulant, used in addition to other fertilizers. It is quick in action and hastens crops to maturity, being extremely soluble. It is easily applied after the plants are above ground. Price per 5 lb. package, 35c. (P. P. 54 lb.); 10 lb. package, 60c. (P. P. 11 lb.); 25 lb. bag, \$1.25; 50 lb. bag, \$2.25; 100 lb. bag, \$4.00; 200 lb. bag, \$7.00; per ton, \$65.00. Quantity required, 100 to 500 lbs. per acre. Liquid, 5 lbs. to 50 gals. of water.

Lime and Land Plaster

Land Plaster or Gypsum. Valuable for soils requiring lime and sulphate; also good on grasslands and sour soils. Price, 100 lb. bag, \$1.00; \$15.00 per ton. Quantity required, One to two tons per acre.

Lime Air Slaked. Price, 100 lb. bag, \$1.00; per ton of 2,000 lbs., \$15.00.

Fertilizing Constituents

Basic Slag. Price, 200 lb. bag, \$2.75; per ton of 2,000 lbs., \$21.00.

Kainit or German Potash Salt. 12% actual potash and 38% common salt. Used chiefly for its potash value. Price, \$1.60 per 100 lbs.; 200 lbs., \$2.35; ton of 2,000 lbs., \$19.00.

Acid Phosphate or Dissolved S. C. Rock. 14% available phosphoric acid, 100 lbs., \$1.60; 200 lbs., \$2.75; per ton, \$20.00.

**HOW KILL
THISTLES**

CANADA THISTLES

**TELLS HOW
IT IS DONE**

Herewith Is Given the Method for Extermination



The Greatest Weed Pest

Diagram showing the characteristic growth of the Canada thistle. The shoots are illustrated in various stages of development, from the most advanced down to buds just starting from the roots

Methods of Distribution and Means of Preventing It

The Canada thistle spreads into new localities, from farm to farm, and even from field to field on the same farm, largely by its seeds. These seeds are smooth, brown, about one-eighth of an inch long, and nearly cylindrical, being a little pointed at one end. Each seed has a tuft of hairs called a pappus. The time of seeding extends from July to October. The principal ways in which the seeds are scattered are as follows:

Wind and Water

After the seeds mature they are easily detached from the heads by the wind and are scattered over the surrounding country. They are also carried by run-off water down hillsides and by streams. Water transportation becomes a special danger in irrigated districts.

Small Grains and Straw

Mature thistle seeds are often harvested with small grains, but are usually separated from them in thrashing. It is often advisable, however, to clean such small grain as is to be used for seed, especially in the case of oats. The thistle seeds are carried over into the straw stacks and from them through the manure to the fields; but if such manure is left in piles for several months practically all the seeds will be decomposed. Harvesting machines often carry the seeds to other fields and thrashing outfits carry them from farm to farm.

Hay

If hay is cut sufficiently early, when the thistles are just starting to bloom, there will be no danger of their maturing seed. If farmers let their hay stand too long, they not only diminish its value but permit the thistle to form seed.

Grass and Clover Seed

Although of infrequent occurrence, the seeds of Canada thistles are sometimes found in grass and clover seed, especially in alsike clover and Canada bluegrass. It is not difficult to detect their presence by the use of a hand lens after a little practice. If in doubt a farmer may send a sample to his State experiment station or to the United States Department of Agriculture, Washington, D. C., for analysis. Farmers' Bulletin 428, entitled "Testing Farm Seeds in the Home and in the Rural School," is of great assistance to farmers in detecting the presence of weed seeds in commercial seed.

Methods of Killing Canada Thistles

After this weed has obtained a foothold the best way to eradicate it is to prevent it from sending up top or above-ground growth, which finally causes the roots to die. This is the basic principle which must be kept in mind at all times. The top of the plant serves much the same purpose as the lungs of animals, so that if the plant is continually deprived of that vital part it must soon die.

There are a number of ways of keeping down the top growth. The best method for each case will depend on the farmer's rotation and convenience. Any practicable method will do. The man is of far more importance than the method. Many farmers make a start to kill the thistle, but abandon their efforts too soon. It is probably no exaggeration to say that 95 per cent of the efforts to kill thistles are failures.

An Experience in Killing Thistles

Mr. Oscar Montgomery purchased a farm in Fulton County, Ohio, at a comparatively low price because it had become badly infested with thistles, every field contained patches of the weed.

It was the general opinion in the community that the thistle had come to stay—that it was a dispensation of Providence that could not be altered. The new owner, however, knew the situation and prepared to meet it.

He wrote to the Department of Agriculture for information on the control of the thistle and was supplied with a statement giving the experience of various farmers in killing this weed. With this, supplemented by his own experience, he outlined a plan of attack. As the efforts of most farmers to kill this weed are unsystematic and lack persistence and the insufficient treatment usually given it, far from reducing its vigor, actually stimulate it to increased growth, he directed all his effort toward the prevention of top or above-ground growth, since only a little top growth is usually sufficient to prolong the life of the thistle until the next year.

The various fields were to be devoted to corn, oats, wheat, hay, and pasture. The first field, of which about 2 acres were thickly set to thistles, was planted in corn in check rows, so as to permit thorough cultivation.

He replaced the cultivator shovels with 8-inch sweeps, thus having an instrument which acted as a series of knives run just under the surface. This is effective, if the edges are kept sharp, in cutting

Canada Thistles May Be Eradicated

off the stems of weeds. Mr. Montgomery found this implement largely responsible for the work of killing out the thistles in his cultivated crops. Some soils are too stony or otherwise unsuitable for this implement. In such cases reliance will have to be put on the ordinary cultivators, and such thistle tops as slip through between the teeth should be cut down with a hoe.

Mr. Montgomery could use this tool only until the corn was laid by, however, and since at that time many thistles were still growing, he modified his plan of attack, but never lessened its vigor. Having the locations of the thistle patches well in mind, he went over them with a hoe, cutting all the tops below the surface of the ground. At the start it was necessary to visit the patches rather frequently (about once a week), but as the season advanced the intervals became less frequent. Assisted by his two children he would attend to it at some odd hour when other work was not pressing. It required about an hour's work each time. He considered it as one of the numerous chores about the place.

Thistle Killed in One Year

After the corn crop was taken off this field was plowed. In the spring it was again planted in corn for the purpose of locating and killing any stray plants that might have persisted, but somewhat to his surprise not a thistle top appeared in the field. The weed had been killed in one season with a little extra work.

A second field was left in pasture during 1911. On the advice of the Department of Agriculture about two acres of this field that were most thickly infested, together with a small infested area in an adjoining meadow, were plowed in June just before the thistle blossomed. After that this plowed area was gone over frequently with a disk and no tops were permitted to appear. About two diskings a week were required at the start, but gradually they became less frequent, until toward the close of the season one in two weeks was sufficient. In 1912 this area was allowed to come up to a volunteer growth and not a thistle top appeared—a second example of eliminating the weed entirely in one year. Since this area was originally so full of thistles as to be practically worthless, the owner did not consider that the following cost him the use of the land. This allowing in best done in the latter part of the season, beginning about the time thistles start to blossom. It may be done on pasture land or may immediately follow hay or grain harvest. It is usually best to follow this treatment with a cultivated crop the next year to kill any of the weeds that may persist.

To Prevent the Thistle Seeding

A third field was planted to oats. Before they started to blossom the owner cut the most thickly infested patches, oats and all; where the thistles were less numerous he cut down the tops with a sharp hoe. The result was a crop entirely free from thistles. Early in the spring this field was seeded to grass and clover. The same procedure was followed in this case as with the oats, and a clean crop of hay resulted. Mr. Montgomery did not expect that this treatment would kill the thistle. His object was to produce clean crops, prevent the thistle from seeding, and weaken its vitality as much as possible. He intended this treatment to hold it in check until the field should be planted to a cultivated crop.

Though a great deal of labor was required the first year, the result was so successful that the work the second year did not amount to more than two days' work for one man.

The principal point in the extermination of Canada thistles is one that it seems hard for many farmers to grasp—that is, that it must be kept in mind and attended to on time and faithfully. Once begun, it must be continued till the thistle tops cease to appear.

Several other methods are recommended by the United States Department of Agriculture. In using any of them the farmer should never lose sight of the all-important point of keeping down the top growth at all times, in order to exhaust the root.

Growing Smother Crops

Among the crops adapted to the purpose of smothering Canada thistles are alfalfa, clover, the grasses, millet, sorghum, hemp, buckwheat, and small grains. Their effect is not only to restrict the top growth of the thistles by shading them, but also to crowd the roots. The land should be occupied by such crops at all times, so that the thistle has no chance to make a recovery. This method seems to be the best adapted to the deeper and more productive soils, where such crops grow well and where the thistle is apt to persist for a longer period than on the shallower and less productive soils. Alfalfa is probably best for this purpose. Good grass and clover stands have also been known to rid fields of thistles.

This method is not as sure in its results as clean cultivation, and seems to be of most value in giving the weed a setback more or less severe, which renders easier the work of clean cultivation that should follow.

Salting Thistles in Pastures

The method of salting thistles in pastures is adapted to small patches accessible to live stock, especially sheep. In their effort to get the salt the stock nibble the thistles and trample them to death. It seems best to let them grow until they start to bloom and then cut off the tops close to the ground and apply a small handful of salt to each new shoot that springs up.

Spraying With Chemicals

Experiments for the purpose of permanently eradicating this weed by the application of plant poisons have not proved very practicable. Although the tops may be injured more or less, the plants make a renewal growth at once. Hence, it appears at present that about the only value of this method is in preventing the thistle from maturing seed in grain fields, thereby being a substitute for cutting. It may be that under certain conditions spraying would be better than cutting, as in the vast grain fields of the semi-arid West. The best materials for this purpose seem to be solutions of common salt, iron sulphate, and arsenite of soda, which is poisonous to man and live stock.

Methods on Waste Lands

The Canada thistle commonly occurs along roadsides and fences, in woodlands, and on other uncultivated lands, where it matures seeds, thus being a menace to the surrounding country. In many cases about all that can be done is to prevent seed from maturing by cutting off the tops at or below the soil surface just as blossoming starts. It will usually be necessary to make two cuttings a year to prevent seeding. Thistles in such locations can be entirely eradicated, however, by continually cutting off the tops until the roots are exhausted.

Summary

Canada thistles can be eradicated in a comparatively short time with little or no loss in the use of the land. The length of time required varies inversely with the thoroughness of the work.

In dealing with this weed the following three rules must never be lost sight of:

Easiest Way to Kill Thistles

(1) The easiest way of killing Canada thistles is to deprive them of their tops continually, thus exhausting the roots. There are various methods of keeping down the tops; there is no one best method. Each field presents a problem in itself and must be handled according to circumstances. Usually some form of clean cultivation is the best, either with a crop or by bare fallow.

Follow Systematic Plan

(2) Outline a systematic plan of attack.
(3) Keep the plan in mind at all times and follow it faithfully.



**CONSIDER
SPECIAL
SUBJECTS**

FARMERS' BULLETINS

**LIBRARY OF
AGRICULTURAL
INFORMATION**

Farmers Should Acquaint Themselves with Farm Subjects

Bulletins in this list will be sent free, on application to the Secretary of Agriculture, Washington, D. C. Because of the limited supply, applicants are urged to select only a few numbers, choosing those which are of special interest to them. Residents of foreign countries should apply to the Superintendent of Documents, Government Printing Office, Washington, D. C., who has these bulletins for sale. Price, 5 cents to Canada, Cuba, and Mexico; 6 cents to other foreign countries. The bulletins entitled "Experiment Station Work" give briefly the results of experiments performed by the State experiment stations.

No.	Subject.	No.	Subject.	No.	Subject.
22.	The Feeding of Farm Animals.	151.	The Home Fruit Garden: Preparation and Care.	232.	Okra: Its Culture and Uses.
27.	Flax for Seed and Fiber.	155.	How Insects Affect Health in Rural Districts.	233.	Experiment Station Work.
28.	Weeds: And How to Kill Them.	157.	The Propagation of Plants.	234.	The Guinea Fowl.
30.	Grape Diseases on the Pacific Coast.	158.	How to Build Small Irrigation Ditches.	236.	Incubation and Incubators.
34.	Meats: Composition and Cooking.	159.	Scab in Sheep.	237.	Experiment Station Work.
35.	Potato Culture.	162.	Experiment Station Work.	238.	Citrus Fruit Growing in the Gulf States.
36.	Cotton Seed and Its Products.	164.	Rape as a Forage Crop.	239.	The Corrosion of Fence Wire.
44.	Commercial Fertilisers.	166.	Cheese Making on the Farm.	241.	Butter Making on the Farm.
48.	The Manuring of Cotton.	167.	Cassava.	242.	An Example of Model Farming.
51.	Standard Varieties of Chickens.	169.	Experiment Station Work.	243.	Fungicides and Their Use in Preventing Diseases of Fruits.
52.	The Sugar Beet.	170.	Principles of Horse Feeding.	244.	Experiment Station Work.
54.	Some Common Birds.	172.	Scale Insects and Mites on Citrus Trees.	245.	Renovation of Worn-out Soils.
55.	The Dairy Herd.	173.	Primer of Forestry. Part I: The Forest.	246.	Saccharine Sorghums for Forage.
56.	Experiment Station Work.	174.	Broom Corn.	248.	The Lawn.
61.	Anparagus Culture.	175.	Home Manufacture and Use of Unfermented Grape Juice.	249.	Cereal Breakfast Foods.
62.	Marketing Farm Produce.	176.	Cranberry Culture.	250.	The Prevention of Stinking Smut of Wheat and Loose Smut of Oats.
64.	Ducks and Geese.	177.	Squab Raising.	251.	Experiment Station Work.
65.	Experiment Station Work.	178.	Insects Injurious in Cranberry Culture.	252.	Maple Sugar and Syrup.
69.	Experiment Station Work.	179.	Horseshoeing.	253.	Germination of Seed Corn.
73.	Experiment Station Work.	181.	Pruning.	254.	Cucumbers.
77.	The Liming of Soils.	182.	Poultry as Food.	255.	The Home Vegetable Garden.
78.	Experiment Station Work.	183.	Meat on the Farm: Butchering, Curing, and Keeping.	256.	Preparation of Vegetables for the Table.
79.	Experiment Station Work.	185.	Beautifying the Home Grounds.	257.	Soil Fertility.
81.	Corn Culture in the South.	186.	Experiment Station Work.	258.	Texas or Tick Fever and Its Prevention.
84.	Experiment Station Work.	188.	Weeds Used in Medicine.	259.	Experiment Station Work.
85.	Fish as Food.	190.	Experiment Station Work.	260.	Seed of Red Clover and Its Impurities.
87.	Experiment Station Work.	192.	Barnyard Manure.	262.	Experiment Station Work.
88.	Alkali Lands.	193.	Experiment Station Work.	263.	Practical Information for Beginners in Irrigation.
91.	Potato Diseases and Treatment.	194.	Alfalfa Seed.	264.	The Brown-tail Moth and How to Control It.
92.	Experiment Station Work.	195.	Annual Flowering Plants.	266.	Management of Soils to Conserve Moisture.
96.	Raising Sheep for Mutton.	196.	Usefulness of the American Toad.	267.	Experiment Station Work.
97.	Experiment Station Work.	197.	Importation of Game Birds and Eggs for Propagation.	269.	Industrial Alcohol: Uses and Statistics.
98.	Insect Enemies of Shade Trees.	198.	Strawberries.	270.	Modern Conveniences for the Farm Home.
101.	Millet.	200.	Turkeys.	271.	Forage Crops Practices in Western Oregon and Western Washington.
103.	Experiment Station Work.	201.	Cream Separator on Western Farms.	272.	A Successful Hog and Seed-corn Farm.
104.	Notes on Frost.	202.	Experiment Station Work.	273.	Experiment Station Work.
105.	Experiment Station Work.	203.	Canned Fruits, Preserves, and Jellies.	274.	Flax Culture.
106.	Breeds of Dairy Cattle.	204.	Cultivation of Mushrooms.	275.	The Gipsy Moth and How to Control It.
112.	The Apple and How to Grow It.	205.	Pig Management.	276.	Experiment Station Work.
114.	Experiment Station Work.	206.	Milk Fever and Its Treatment.	277.	The Use of Alcohol and Gasoline in Farm Engines.
119.	Experiment Station Work.	209.	Controlling the Boll Weevil in Cotton Seed and at Ginneries.	278.	Leguminous Crops for Green Manuring.
120.	Insects Affecting Tobacco.	210.	Experiment Station Work.	279.	A Method of Eradicating Johnson Grass.
121.	Beans, Peas, and Other Legumes as Food.	211.	Raspberries.	280.	A Profitable Tenant Dairy Farm.
122.	Experiment Station Work.	212.	The School Garden.	281.	Experiment Station Work.
126.	Practical Suggestions for Farm Buildings.	213.	Lessons from the Grain Rust Epidemic of 1904.	282.	Celery.
127.	Important Insecticides.	219.	Tomatoes.	283.	Spraying for Apple Diseases and the Codling Moth in the Osage.
128.	Eggs and Their Uses as Food.	221.	Fungous Diseases of the Cranberry.	284.	Insects and Fungous Enemies of the Grape Vines of the Rocky Mountains.
131.	Household Tests for Detection of Oleomargarine and Renovated Butter.	222.	Experiment Station Work.		
133.	Experiment Station Work.	223.	Miscellaneous Cotton Insects in Texas.		
134.	Tree Planting on Rural School Grounds.	224.	Canadian Field Peas.		
137.	The Angora Goat.	225.	Experiment Station Work.		
138.	Irrigation in Field and Garden.	227.	Experiment Station Work.		
139.	Emmer: A Grain for the Semi-arid Regions.	228.	Forest Planting and Farm Management.		
140.	Pineapple Growing.	229.	The Production of Good Seed Corn.		
142.	Principles of Nutrition and Nutritive Value of Food.	231.	Spraying for Cucumber and Melon Diseases.		
144.	Experiment Station Work.				
149.	Experiment Station Work.				
150.	Clearing New Land.				
152.	Scabies of Cattle.				

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Farmers' Bulletins—Continued*

No.	Subject.	No.	Subject.	No.	Subject.
234.	Comparative Value of Whole Cotton Seed and Cotton-seed Meal in Fertilizing Cotton.	357.	Methods of Poultry Management at the Maine Agricultural Experiment Station.	420.	Oats: Distribution and Uses.
237.	Poultry Management.	358.	A Primer of Forestry. Part I. Practical Forestry.	421.	The Control of Blowing Soils.
238.	Nonsaccharine Sorghums.	359.	Canning Vegetables in the Home.	422.	Demonstration Work on Southern Farms.
239.	The Cotton Bollworm.	360.	Experiment Station Work.	423.	Forest Nurseries for Schools.
240.	Cost of Filling Silos.	361.	Meadow Fescue: Its Culture and Uses.	424.	Oats: Growing the Crop.
241.	Use of Fruit as Food.	362.	Conditions Affecting the Value of Market Hay.	425.	Experiment Station Work.
242.	Farm Practice in the Columbia Basin Uplands.	363.	The Use of Milk as Food.	426.	Canning Peaches on the Farm.
243.	Potatoes and Other Root Crops as Food.	364.	A Profitable Cotton Farm.	427.	Barley Culture in the Southern States.
244.	Experiment Station Work.	365.	Farm Management in Northern Potato-growing Sections.	428.	Testing Farm Seeds in the Home and in the Rural School.
245.	Food Value of Corn and Corn Products.	366.	Experiment Station Work.	429.	Industrial Alcohol.
246.	Diversified Farming Under the Plantation System.	367.	Lightning and Lightning Conductors.	430.	Experiment Station Work.
247.	Home-grown Tea.	368.	The Eradication of Blind-weed, or Wild Morning-glory.	431.	The Peanut.
248.	Sea Island Cotton: Its Culture, Improvement and Diseases.	369.	How to Destroy Rats.	432.	How a City Family Managed a Farm.
249.	Corn Harvesting Machinery.	370.	Replanting a Farm for Profit.	433.	Cabbage.
250.	Growing and Curing Hops.	371.	Drainage of Irrigated Lands.	434.	The Home Production of the Onion Seed and Sets.
251.	Experiment Station Work.	372.	Boys' and Girls' Agricultural Clubs.	435.	Experiment Station Work.
252.	Dodder in Relation to Farm Seeds.	373.	Irrigation of Alfalfa.	436.	Winter Oats for the South.
253.	Roselle: Its Culture and Uses.	374.	Experiment Station Work.	437.	A System of Tenant Farming and Its Results.
254.	Experiment Station Work.	375.	Care of Food in the Home.	438.	Hog Houses.
255.	A Successful Alabama Diversification Farm.	376.	Game Laws for 1909.	439.	Anthrax.
256.	Sand-clay and Burnt-clay Roads.	377.	Harmfulness of Headache Mixtures.	440.	Spraying Peaches for the Control of Brown-Rot, Scab, and Curculio.
257.	A Successful Southern Hay Farm.	378.	Methods of Exterminating the Texas-fever Tick.	441.	Lespedeza, or Japan Clover.
258.	Harvesting and Storing Corn.	379.	Hog Cholera.	442.	The Treatment of Bee Diseases.
259.	Experiment Station Work.	380.	The Loco-weed Disease.	443.	Barley: Growing the Crop.
260.	Experiment Station Work.	381.	The Adulteration of Forage-plant Seeds.	444.	Remedies and Preventives Against Mosquitoes.
261.	Cowpeas.	382.	Experiment Station Work.	445.	Marketing Eggs Through the Creamery.
262.	The Use of the Split-log Drag on Earth Roads.	383.	Experiment Station Work.	446.	The Choice of Crops for Alkali Land.
263.	Milo as a Dry-land Grain Crop.	384.	Boys' and Girls' Agricultural Clubs.	447.	Bees.
264.	Clover Farming on the Sandy Jack-pine Lands of the North.	385.	Potato Culture on Irrigated Farms of the West.	448.	Better Grain-Sorghum Crops.
265.	Sweet Potatoes.	386.	The Preservative Treatment of Farm Timbers.	449.	Rabies, or Hydrophobia.
266.	Small Farms in the Corn Belt.	387.	Experiment Station Work.	450.	Some Facts About Malaria.
267.	Building Up a Run-down Cotton Plantation.	388.	Bread and Bread Making.	451.	Experiment Station Work.
268.	Silver Fox Farming.	389.	Pheasant Raising in the United States.	452.	Capon and Caponizing.
269.	Experiment Station Work.	390.	Economical Use of Meat in the Home.	453.	Danger of General Spread of the Gipsy and Brown-tail Moths Through Imported Nursery Stock.
270.	Deer Farming in the United States.	391.	Irrigation of Sugar Beets.	454.	A Successful New York Farm.
271.	Forage Crops for Hogs in Kansas and Oklahoma.	392.	Habit-forming Agents.	455.	Red Clover.
272.	Nuts and Their Uses as Food.	393.	The Use of Windmills in Irrigation in the Semi-arid West.	456.	Our Grobeaks and Their Value to Agriculture.
273.	Cotton Wilt.	394.	Sixty-day and Kherson Oats.	457.	Experiment Station Work.
274.	Experiment Station Work.	395.	The Muskrat.	458.	The Best Two Sweet Sorghums for Forage.
275.	Harmful and Beneficial Mammals of the Arid Interior.	396.	Farm Practice in the Use of Commercial Fertilisers in the South Atlantic States.	459.	House Flies.
276.	Cropping Systems for New England Dairy Farms.	397.	Irrigation of Grain.	460.	Frames as a Factor in Truck Growing.
277.	Macadam Roads.	398.	A More Profitable Corn-planting Method.	461.	The Use of Concrete on the Farm.
278.	The Basket Willow.	399.	The Protection of Orchards in the Pacific Northwest from Spring Frosts by Means of Fires and Smudges.	462.	The Utilization of Logged-off Land in Pasture in Western Oregon and Western Washington.
279.	Experiment Station Work.	400.	Canada Bluegrass: Its Culture and Uses.	463.	The Sanitary Privy.
280.	The Cultivation of Tobacco in Kentucky and Tennessee.	401.	The Construction of Concrete Fence Posts.	464.	The Eradication of Quack-horn.
281.	The Boll-weevil Problem with Special Reference to Means of Reducing Damage.	402.	Irrigation of Orchards.	465.	Experiment Station Work.
282.	Some Common Disinfectants.	403.	Experiment Station Work.	466.	Winter Emmer.
283.	The Computation of Rations for Farm Animals by the Use of Energy Values.	404.	The Potato as a Truck Crop.	467.	The Control of the Chestnut-bark Disease.
284.	The Repair of Farm Equipment.	405.	School Exercises in Plant Production.	468.	Forestry in Nature Study.
285.	The Dairy Industry in the South.	406.	School Lessons on Corn.	469.	Experiment Station Work.
286.	The Dehorning of Cattle.	407.	Potato Culls as a Source of Industrial Alcohol.	470.	Game Laws for 1911.
287.	The Tuberculin Test of Cattle for Tuberculosis.	408.	Feeding Hogs in the South.	471.	Grape Propagation, Pruning, and Training.
288.	Experiment Station Work.	409.	Experiment Station Work.	472.	Systems of Farming in Central New Jersey.
289.	Onion Culture.	410.	The Care of Milk and Its Use in the Home.	473.	Tuberculosis.
290.	A Successful Poultry and Dairy Farm.	411.	Corn Cultivation.	474.	Use of Paint on the Farm.
		412.	Seed Corn.	475.	Ice Houses.
		413.	The Production of Cigar-leaf Tobacco in Pennsylvania.	476.	The Dying of Pine in the Southern States, Cause, Extent, and Remedy.
		414.	Rice Culture.	477.	Sorghum Syrup Manufacture.
		415.	Experiment Station Work.	478.	How to Prevent Typhoid Fever.
		416.		479.	Experiment Station Work.
		417.		480.	Practical Methods of Disinfecting Stables.
		418.		481.	Concrete Construction on the Live Stock Farm.

* Bulletins being steadily increased in number. Write to Government for list of later bulletins.

Farmers' Bulletins—Continued

No.	Subject.	No.	Subject.	No.	Subject.	
482.	The Pear and How to Grow It.	500.	Raising Belgian Hares and Other Rabbits.	512.	The Boll Weevil Problem	
483.	The Thornless Prickly Pears.	501.	Some Common Game, Aquatic, and Rapacious Birds in Relation to Man.	514.	Experiment Station Work.	
484.	Some Common Mammals of Western Montana in Relation to Agriculture and Spotted Fever.	498.	Methods of Exterminating the Texas-fever Tick.	515.	Vetches.	
485.	Sweet Clover.	499.	Experiment Station Work.	516.	The Production of Maple Syrup and Sugar.	
486.	Experiment Station Work.	500.	The Control of the Boll Weevil.	517.	Experiment Station Work.	
487.	Cheese and Its Economical Uses in the Diet	501.	Cotton Improvement under Weevil Conditions.	518.	Winter Barley.	
488.	Disease of Cabbage and Related Crops and Their Control.	502.	Timothy Production on Irrigated Land in the Northwestern States.	519.	An Example of Intensive Farming in the Cotton Belt.	
489.	Two Dangerous Imported Plant Diseases.	503.	Comb Honey.	521.	Canning Tomatoes at Home and in Club Work.	
490.	Bacteria in Milk.	504.	Experiment Station Work.	522.	Experiment Station Work.	
491.	The Profitable Management of the Small Apple Orchard on the General Farm	505.	Benefits of Improved Roads.	523.	Tobacco Curing.	
492.	The More Important Insect and Fungous Enemies of the Fruit and Foliage of the Apple.	506.	Food of Some Well-Known Birds of Forest, Farm and Garden.	524.	Tile Drainage on the Farm.	
493.	The English Sparrow as a Pest.	507.	The Smuts of Wheat, Oats, Barley and Corn.	525.	Raising Guinea Pigs.	
494.	Lawns and Lawn Soils.	Washington: Government Printing Office: July, 1914.	508.	Market Hay.	526.	Mutton and Its Value in the Diet.
495.	Alfalfa Seed Production.	509.	Forage Crops for the Cotton Region.	528.	Hints to Poultry Raisers	
		511.	Farm Bookkeeping.	529.	Vetch Growing in the South Atlantic States.	
				530.	Important Poultry Diseases.	
				531.	Larkspur, or "Poison-Weed."	
				532.	Experiment Station Work.	
				533.	Good Seed Potatoes and How to Produce Them.	
				534.	Durum Wheat.	
				535.	Sugar and Its Value as Food.	
				536.	Stock Poisoning Due to Scarcity of Food.	

CANADIAN FARMERS' BULLETINS

Many bulletins and pamphlets of great value to the farmer and dealing with topics of particular interest to Canadians are issued by the Dominion Department of Agriculture, as well as by several of the separate Provinces. In most cases these are free. Detailed information concerning subjects discussed may be found on pages 24, 41, 50, 54, 60 and 69.

HOW TO PREVENT FLOODS

In 1883, Thomas E. Hill excavated a swamp to a depth of three feet, made of it a charming little three-acre lake and reclaimed several acres adjoining the body of water on a farm he owned at that time.

This lake was filled with surface water from the first spring rains and from that time to this has been a feature of value and beauty on the premises. The supposition had been that this water might become stagnant, but, agitated by winds blowing across it, it is always clear and fresh.

An important discovery was made following the making of this lake. During the dry weather, while the evaporation of moisture caused a falling in the depth of water, it was not sufficient to make the lake dry, but it was sufficient to give a heavy second crop of hay on all the surrounding land.

Since the construction of this body of water many have been the values and pleasures resulting from it. Though small in area, it was immediately appropriated for boating; it became the home for warm water fish; it made a place for winter skating, a reservoir from which water could be obtained for watering trees and plants, and it has for years supplied a town of several hundred people with ice.

This little body of water is full of suggestions, among them being an admirable place for keeping waterfowl, the increased size of crops resulting from evaporation of moisture; the holding of water falling upon the soil, preventing its escape into

flood waters which devastate the lower lands; the reclaiming of low, wet, waste land and the beautifying of all properties where such lakes may be constructed.

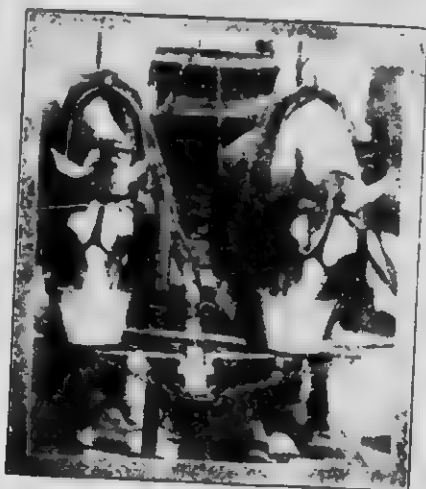
How to secure the making of these water reservoirs is the question.

As yet no practicable method has been devised for preventing floods. Various plans are proposed, including principally the dredging and enlargement of rivers, but with the putting in of thousands of miles of drain tile every year, increasing the rapid outflow with every long rain, it is seen that unless some method is adopted that will hold the water where it falls upon the uplands, floods will become more and more a danger.

The description herewith given of this little lake is merely a suggestion. Mr. Hill does not tell how the thousands of water reservoirs in the uplands may be obtained. He rests his case by saying that the thousands of miles of tiling put in by farmers in draining their land is one cause of floods, and the remedy is to hold the water where it falls upon farm land.

Whether it would not be less expensive for the government to co-operate with farmers in making reservoirs to hold rainfall, rather than to annually spend millions of dollars in repairs after floods which do nothing to prevent floods in coming years, is a subject for consideration.

KIND TREATMENT OF ANIMALS AND TREES



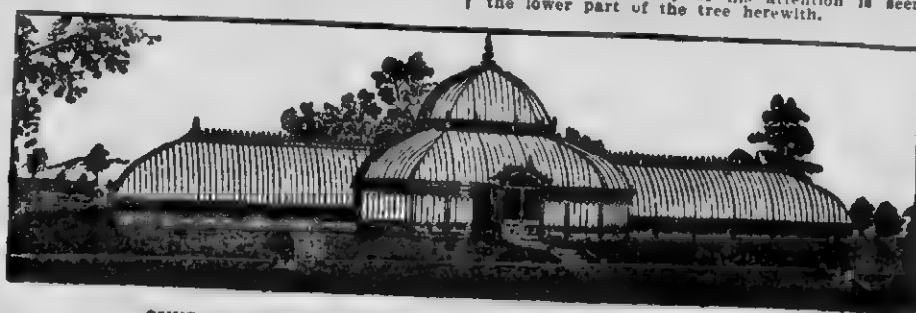
Nosebag Abolished.

When ready to eat the noon meal the kind, thoughtful master of the horse provides opportunity whereby the animal may eat in comfort. The humane sentiment of your town should abolish the cruel nosebag.



American Elm

The streets about your premises may be bordered with American elm trees. The experienced forester of the town will trim these trees into graceful form. The necessity of his attention is seen in the lower part of the tree herewith.



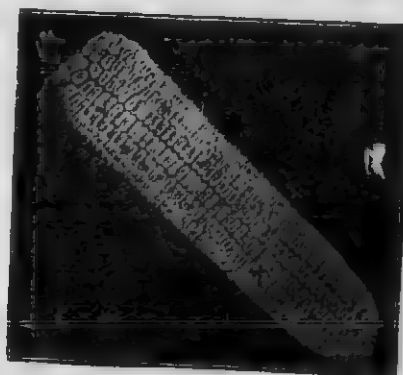
CONSERVATORY WITH WINGS ATTACHED.—From Lord & Burnham's Book of Plans.



Inferior.

These two ears of corn represent the two types of farmers, one who is satisfied to produce the inferior.

**Two
Kinds
Farm
Products**



The other is not content unless he exhibits the best. Determines always to excel, to do better.

IN THE
COUNTRY

CITY FAMILY

HOW THEY
SUCCEEDED

Lessons for Thousands of City Families

FARMERS' BULLETIN 452, U. S. DEPARTMENT OF AGRICULTURE

By J. H. Arnold, Scientific Assistant, Office of Farm Management, Bureau of Plant Industry

Introduction

This is a record of the experience for 18 years of a city family that moved onto a farm in 1892. The father had been a lawyer by profession, the manager of a well-established business firm in one of the principal cities of the Middle West, and was earning a salary of \$3,000 a year. At 60 years of age, having been in business about twenty-five years, he was compelled on account of ill health to abandon his profession and business. There were 10 children in the family, ranging from 2 to 21 years of age, of whom 7 were boys.

Under these conditions, with available capital amounting to about \$10,000, which had been partly saved in business and partly received by inheritance, the family decided to buy a farm and attempt to solve the problem confronting them, namely, "to make a living, educate the children, and make a pleasant home." This paper tells how they satisfactorily solved the problem, and while this is not a story of typical farm life, it shows what courage, energy, business ability, and moderate capital may accomplish on a farm. The fact that this farmer has been successful without previous experience or special training, following systematically the ordinary cropping system and methods of tillage, with the exercise of good judgment, shows that the chances for success in farming are as good as in most business enterprises.

An attempt is made to present such facts about this farm as will enable the reader to comprehend under what conditions and by what means the results were accomplished; hence, a description of the farm and the methods of operating it will be given in some detail. It is not intended to indicate in this description ideal methods of farming. As a model of farm management from the standpoint of maintaining soil fertility and thus obtaining large crop yields this bulletin will have no special interest. The methods of keeping accounts have been the instruments through which this farmer has kept track of his business, but they are not given as model forms. The description given is rather for the purpose of enabling the reader to get the point of view and spirit of the family in meeting the problems of life and realizing their ideals on a farm.

It is believed that this farmer has, by his experience, answered the chief objections to farming as an occupation and to a farm as a place for establishing an ideal home. These objections, as usually stated, are that farming is not as remunerative as other occupations for the same ability and effort expended, that the family is deprived of desirable educational and social opportunities, and that the labor is too hard and uninspiring, especially for the women. The record will also show how some important social, economic, and technical farm problems have been worked out; for instance, the farm-labor problem, the household problem, the training of children in responsibility in management, and the doing of farm work in a way to meet the requirements of a normal social life and of cultivated intellectual tastes. It is also believed that a narrative of American farm life, such as this, will demonstrate not only the possibilities but the desirability and dignity of farming as an occupation.

While the owner of the farm wishes to avoid publicity, he is willing that the results of his experience be made known in order that other city men may feel safe in attempting to support and educate their families in this manner.

A diary and a financial record were kept on this farm for a period of seventeen years. The facts here given are based upon these records.

Description of the Farm

When the family began country life in 1892 the farm consisted of 300 acres in a much run-down condition. About 80 acres were added to the farm a few years later, making the entire farm consist

at present of 380 acres. It was an old farm, having been located and surveyed about the middle of the eighteenth century. The old house, which had been built about 100 years ago, was still substantial. In a remodeled form it is now the kitchen of a modern house. Much of the land had been allowed to grow up in bushes and young trees. The barns and fences were out of repair, so that the place as a whole presented a dilapidated appearance. The farm had been rented out and had produced a gross income of about \$700 a year.

The location is in the beautiful and fertile region known as the Shenandoah Valley, the middle section of the great Appalachian Valley which extends from the northeast corner of Pennsylvania to central Alabama. It is about 100 miles from a seaboard city and is accessible to railways leading to New York and to the large cities of the Ohio and Mississippi valleys. In this section there are now good turnpike roads. One of these passes the farm and leads to a shipping point 3 miles distant and to the county town of 2,500 inhabitants, $8\frac{1}{2}$ miles distant.

The soil here is residual, formed from a limestone of the Cambro-Silurian age, having a rich brown color and, according to the classification adopted by the Bureau of Soils of the Department of Agriculture, is a clay loam of the Hagerstown series.

Capital and Other Resources

The inventory taken January 1, 1892, showed that the land with improvements was valued at \$65 an acre, the whole farm and equipment being worth \$19,707. The debt on the farm, \$8,459, and money borrowed for fertilizer, \$220, made the total liabilities \$8,679, which, deducted from the above assets, left a balance of \$11,028, which constituted the "present worth" of farm and equipment at that date.

Arrangement of the Fields

The general management of the farm seems to have been well thought out from the first. The farm was laid out originally about as it appears at present, and with slight changes to fit conditions the cropping system was the same as now. It is divided into ten fields ranging from 18 to 44 acres in size, with 15 acres of woodland, and these fields are located on either side of a lane.

Special attention was given to laying out the farm. All the fields except one may be reached within 650 yards of the barnyard, and the last field is within half a mile. The fields are as long as can be arranged in accordance with the general farm plan. This is regarded as an important feature in the arrangement, since the time saved during the year in turning corners when plowing and in doing other farm operations is considerable. The gate to each field is placed at the corner nearest the barn, and workmen are required to leave implements at the gate when coming in from the fields. The lane leading to the fields is 30 feet wide; except for the wagon track it is grown up in bluegrass, so there is practically no waste on its account. A well, 80 feet deep, located in a farther field, supplies water by windmill to a cement trough, which is so placed that it furnishes water in two fields and may be reached easily through the lane from other fields.

Cropping System

The general crop history of each field has following system of rotation: Corn, wheat, wheat, grass for hay, pasture, corn. Usually two wheat crops follow in succession, and now and then if the stand of grass is not good it is plowed up, put into corn, and reseeded the next year to wheat. The crops raised on each field during 1910 being as follows: 1, pasture; 2, corn; 3, hay; 4, wheat; 5, wheat; 6, pasture; 7, wheat; and 8, pasture. This gives the following acreage of crops: Wheat, 95

The City Family's Help on the Farm

acres; corn, 40 acres; hay, 40 acres, including alfalfa; pasture, 75 acres, besides the permanent pasture. There are thus 262 acres which have been farmed in the five or six year rotation for nearly seventeen years. During this time the division of crops, which have been run in rotation, has been on the average as follows: Corn, 47 acres, wheat, 80 acres, and hay and pasture, about 135 acres. It is to be added, however, that a field of 80 acres, which is now in orchard, was put in some field crop up to the time the trees were six or seven years old. The bearing orchard, 15 acres, is now 14 years old, and the remainder, 15 acres, is in 1 and 2-year old trees. The young orchard is in corn, making the total acreage of corn 55 acres.

On one field alfalfa was sown in the fall. The alfalfa was not able to crowd out weeds, especially the sorrel, which for a time threatened to take the crop. During the next spring and summer the field was disked twice and harrowed two or three times with a spring-tooth harrow, and in September a heavy coating of lime was applied as a top dressing. On September 23 the alfalfa was vigorous and the indications were that it would continue to thrive.

Water Supply and Sewerage

The barn lots, dwelling, and permanent pasture fields are supplied from a well near the premises. By means of a steam engine the water is lifted into a tank and distributed through pipes where needed. The dwelling is equipped with modern conveniences, such as bathroom, water closet, lavatories, and hot water. The sewage is distributed through tiles in the orchard. The entire system was planned by the owner and the work done by labor on the farm.

Buildings

The buildings have been constructed from the point of view of economy in expense and convenience in use. There are good, substantial horse and cow barns. Their location has been planned in accordance with principles of economy in getting to the fields on the farm. The cow barn and lots are so placed that all the fields may be reached directly. Stock cannot interfere with other buildings and premises. Horses may be taken to the fields by opening one gate. The wagon shed is so constructed that the teams are simply driven through the shed and the wagons left standing in their proper places. No labor and time are consumed in pulling or pushing the wagons into place.

Labor

The System of Employment

The farm laborers, who are hired by the year, have families, and live in houses built especially for their use. One acre of ground goes with each of the houses for a family garden. Barn room and the necessary outbuildings for stock belonging to the laborers are also furnished.

The plan of housing laborers in separate quarters is followed, first, to secure privacy and freedom in the home and to relieve the household from extra labor. Second, experience shows that it is possible to secure better service by having men with families. This plan has been followed with but few exceptions from the first and has been quite satisfactory to the family and to the men. As a rule these men have been recruited from factories, railroads, and mines. They are secured by offering inducements not usually given on farms. Ten hours of labor, for instance, is all that is required, and usually a part holiday on Saturday. Sometimes a whole day is given as time off to work their gardens, etc. Any special service or extra good work is rewarded in some way.

The standard money wages paid is \$200 a year. In addition a dwelling, 1 acre of garden, one cow and pasture, and firewood are furnished. Remuneration beyond this is dependent upon the quality of service. If satisfactory service has been given during the first year \$25 extra is paid in cash and 5 barrels of corn to fatten hogs. After two years of satisfactory service \$50 in cash and 10 barrels of corn are given at the end of each year. If wheat is put in satisfactorily and the crop is good, 80 bushels of wheat in the mill is added to the income of the laborer's family. The laborer may keep as many fowls as he chooses, inclosed. He has the same area of garden as his employer's family and may sell as much as he likes from it.

This plan has enabled the majority of the laborers who have lived on this farm to accumulate a suffi-

cient amount of capital to take up farming for themselves. Some have become owners of farms. The employer takes pains to teach his men good farming methods.

At least one of the laborers is expected to have sufficient mechanical ability to do all needed repairing and to help with the construction of buildings on the farm. For this purpose there is a well-equipped blacksmith and carpenter shop. This provides work on rainy days and in the winter.

Relation Between Owner and Laborer

The proprietor takes a personal interest in the welfare of the laborer and his family. He holds that work cannot be secured unless the laborer is contented and gives his services cheerfully. Mutual goodwill develops when the employer is careful in the selection of his men and permits them to share in the general success of the farm. In 1909 the best laborer on the farm, the man longest in service, concluded to begin farming for himself. The employer bought 20 acres of land for him, which will be paid for in small sums, as he can afford to make payments.

Economical Use of Labor

The economical use of labor is one of the most serious problems in farming. This farmer has plans drawn for the remodeling of buildings, the changing of fences, and the erection of new buildings. "I make these plans as they come into my mind," he says, "and when labor cannot be profitably used in the fields it is employed in carrying out these plans. As a rule, I plan ahead for my farm work and find that it pays, since we lose no time, and labor can always be profitably employed."

During the winter of 1909-10 a new tenant house was planned by the owner and largely constructed by the regular farm labor, with such other help as could be obtained in the community. The large barn on the farm was built entirely by the men and boys of the family and two laborers.

Family Discipline and Occupation

The occupations and labor of the family are not arranged from the standpoint of economic results, but in accordance with the principle stated in the introduction—that of properly training the children and making the home pleasant.

In the home the children, from the time they were old enough to perform any service, have been required "to do something for the profit or welfare of the family before having any breakfast." The work done by the family in the house was systematized in such a way that each member when old enough assumed responsibility for some of the work. This system of training is adapted to the requirements of farm life. There have been developed on the farm, industries such as dairying, poultry keeping, gardening, orcharding, and general farming. At the present time one son makes the apple orchard his specialty. A daughter is responsible for the poultry and another for the marketing of produce and the bookkeeping. The mother does the cooking and supervises the dairy. The father superintends the whole farm, sees that crops are properly put in and cultivated, and that the stock is well cared for. He is in touch with every operation on the farm and inspects all the work that is done.

Special attention is given to the care of work-horses. Every evening the shoulders of work-horses are bathed with cold water. At noon in summer the laborers are given an extra half hour to unharness and re-harness the horses. As a result of this special care, sore shoulders on horses are seldom known on this farm.

The Housework Problem

No regular house servants are kept in the home. The work of housekeeping is done by the mother and two daughters. The laundry work is done outside. All heavy work, and such labor as caring for the garden, etc., is done by the men. The cooking arrangements are planned to economize labor and make it as easy as possible. A hot water tank is connected with the plumbing system, so that plenty of hot and cold water can be had at any time. This arrangement, combined with a large sink from which waste is carried to the sewer, eliminates most of the conditions which tend to make housework drudgery. Utensils are kept in their proper places, so that they can be reached with the fewest possible steps.

What Was Raised in the Garden

The Farm Garden

The garden, consisting of about 1 acre of land, is an important feature in the management of this farm. Besides the vegetables an income of about \$200 a year, the garden brings an income of about \$200 a year, the products being exchanged for groceries. This pays the expenses of the table. The principal money crops from the garden are kale, spinach, winter onions (sown in early spring), tomatoes, and cantaloupes. Kale and spinach are not common crops in this section and a ready market has always been found for them. Others, however, are beginning to raise kale on their own account, so that more spinach is now being raised on this farm. Prices have ranged from 40 to 60 cents a bushel for kale and 60 to 80 cents a bushel for spinach. From 250 to 300 bushels an acre is considered a good crop. Besides being raised for the market, kale is used as a general winter cover crop in the garden. On September 23 kale was coming up in all places not in regular garden crops. It is found that kale plowed under in the spring puts the ground in fine condition for cantaloupes.

A specialty has been made of raising late tomatoes to be put on the market when this fruit is scarce. Tomatoes are sold from this garden about the last of October and in November. Most of the products are sold by telephone to the merchants in the town and villages in the county.

What Grows in Garden

The acre of garden is sown each year about as follows, with the permanent small fruit and the asparagus bed, all in rows 160 ft. long:

- 1 row of grapes.
- 15 rows of spinach.
- 6 rows of kale.
- 10 rows late corn in roasting ear, to be followed by kale as a cover-crop.
- 4 rows cantaloupes, followed by cover-crop of kale.
- 1 row oyster plants
- 8 rows of late tomatoes for October and November markets.
- 1 row of kale or spinach.
- 2 rows lima beans.
- 1 row celery.
- 2 rows early tomatoes.
- 1 row cabbage
- 7 rows sugar beets.
- 11 rows winter onions.
- 2 rows late corn.
- 2 rows new strawberry bed.
- 3 rows cuibert raspberries.
- Old strawberry bed 29 feet wide.
- 30 feet asparagus bed.
- 20 rows early potatoes.

A row of grapes occupies the space along the fence at one end of the garden. There are also four short rows outside. The vines are trimmed in winter, but receive no other special care. When the fruit is formed in early spring the bunches are bagged with 2-pound grocery bags, tied securely with a string about the base of the stem. It is stated that these bagged bunches will stay well preserved on the vines until frozen off. The bunches still hanging on the vines unbaggged were badly diseased and rotted on September 23.

The Orchard

The 30-acre field now planted in orchard has 15 acres in the bearing stage. With the exception of a few old trees near the house this orchard is 12 to 14 years old. The trees were planted in the ordinary manner about 30 feet apart, cultivated in crops for six or ten years, then seeded to grass and clover. At two different times a bushel of wood ashes was put around each tree. This year manure was hauled between the rows and spread about 10 feet from the trees. Since it has been in grass the orchard has been pastured by sheep and hogs. The branches are thinned out in the dormant season, being trimmed mostly at the top. The trees are sprayed four times a year, twice for the San Jose scale and twice for the codling moth. There is a space of about half an acre with no trees. The orchard had become infested with the San Jose scale and the infested trees were cut out before the proprietor learned how to deal with this pest.

Reference to the table of receipts and expenditures shows that this orchard has been bringing in a substantial income for three years. Last year 800 barrels of apples were marketed at \$2.10 a barrel. The varieties grown for market are the Ben Davis and York Imperial. It is planned to increase the size of the orchard until it reaches about 100 acres.

Woodland and Permanent Pasture

About 30 acres of the farm in one tract is in forest, containing many large and valuable oak, hickory, elm, and walnut trees. One field, in which are many of these trees, is known as "The Refuge." Squirrels play without fear in this field. Where the trees have been thinned out in the woodland, bluegrass has come up luxuriantly, so that the greater part of three fields on the farm furnish fine pasture in the early spring.

Stock

In the inventory of January 1, 1906, 182 head of live stock were recorded, and on January 1, 1907, there were 300. Averaged for five years the proportion of different kinds of live stock is about as follows: Horses, 10; cows and stock cattle, 40; young cattle, 10; hogs, 35, and sheep, about 100. On the average about 150 acres remain in pasture. To show that this farm has about the right area in pasture, the following estimate of pasture area for each class of stock is given:

40 cows and stock cattle.....	80 acres
10 young cattle.....	15 acres
35 hogs.....	10 acres
100 sheep.....	40 acres
10 horses and colts.....	15 acres

100 acres

The dairy department of the farm maintains on the average 8 to 10 cows. Butter is made and sold in the local markets. It is found to be more profitable to buy young steers and keep them a year than to buy and feed the same year.

Sheep have always been kept on the farm and the profit in them is very satisfactory. Ten horses and 3 or 4 colts are kept on the place. Seven horses are used for farm work and 3 for driving.

Tillage

Three-horse plows are run from 9 to 10 inches deep for both corn and wheat. No guessing is allowed on this point, since the furrows are measured frequently to see that the required depth is maintained. The ground for wheat is prepared in the following manner: As soon after harvest as possible the stubble ground is plowed, the second time with a roller and harrowed again, the second time with a spike-tooth harrow. A spring-tooth harrow precedes the drill. The wheat is sowed about September 25. Wheat to follow corn is put in as soon as possible after the corn is cut, the land being prepared by running a disk harrow over the field and then a spring-tooth harrow. Sometimes the spring-tooth harrow alone is deemed sufficient. The land is then drilled the same as the plowed ground.

Corn is planted on land which has been in pasture. Before plowing, the ground is covered with stable manure. After plowing it is pulverized with a disk harrow and cross-harrowed before the planter. It is harrowed once after planting and then cultivated with two-horse cultivators, the last time or two very shallow.

Fertilizers

The manure spreader is regarded as one of the most important implements on the farm. By means of it, it has been possible during the past few years to cover about 75 acres of the farm each year with stable manure.

It is a common practice in this section to use commercial fertilizers when sowing wheat and grass. The fertilizer is mixed on the farm. It consists of a mixture of one-half of ground raw bone, containing 22 per cent of phosphoric acid and 24 per cent of nitrogen, and one-half of South Carolina ground rock, containing 16 per cent of phosphoric acid. It has not been the practice on the farm to plow under green crops, although the benefit of such practice is recognized. A straw mulch has been put on part of a field at different times and plowed under. The results have been good. One year the plowing under of straw alongside of land well manured gave about the same results as manured land. In the year 1909 a part of the wheat stubble was mowed soon after harvest to serve as a mulch. On the ground that was mowed the clover was taller and more vigorous on September 3. The difference was to be seen also on September 23. The year 1909 being very dry, this covering no doubt prevented the evaporation of moisture and thus aided the clover in making a better growth.

What City Family Gained by Going to the Farm

Financial Record of the Farm Inventories

A simple but quite complete record of results on this farm has been kept from the time the farm was purchased until the present time. This is in the form of a diary and a bookkeeping record. On January 1 of each year an inventory was made. In 1892 the value of the plant was \$18,167; in 1905 it was \$32,845, in 1906 it amounted to \$41,972. It will be seen that the value of the plant has more than doubled during the seven-year period. The net income has more than doubled also, and the increased valuation of the real estate could properly be based on the income.

Receipts and Expenditures

Businesslike receipts and expenditures are kept each year. Receipts include fat calves, hogs, sheep, wheat, corn, poultry, dairy products, etc. Expenditures include the cost of seed, fertilizer, labor, etc. The net income for 1906 was \$8,097; the expenditures, \$4,309; the net income, \$3,788.

Corn and Wheat

The average yield of wheat during these years was 18 bushels an acre; that of corn nearly 40 bushels (eight barrels) an acre. These were fair yields, somewhat above the average for this region. The average cost per acre of raising wheat was \$6 an acre. In this estimate the rent of land and the cost of superintendence are not included. It is believed that these figures fairly represent the cost of raising wheat in this region.

No record is shown of the cost of raising corn. The owner estimates, however, that it costs more to raise corn than wheat.

Hay on this farm is handled by modern machinery. It has produced on the average about 1½ tons per acre.

What the Farm Has Been Made to Accomplish for the Family

An attempt has been made to set forth the actual operations of the farm. They are not set forth as models. On the whole, however, they represent good farm practice.

To just what degree this family has been successful depends upon the point of view taken. The financial record might seem to some disappointing, considering the amount invested and the number of people taking part in the labor producing these results. In terms of dollars and cents it might not be considered a paying business. On the other hand, if we consider the results produced through the use made of the net income, the farm tells a different and a more satisfactory story. As has been stated, the intention in going on the farm was not primarily to increase the income, nor were money profits more than a secondary consideration. In the first place, the father was ill and was told by his physician that he could not live another year in the city if he continued his business. Some of the children were very young, while others were ready to enter the university. In order to measure success from the standpoint of the father and the mother we must know about the family and what it has accomplished and is doing.

The boys have graduated from a State university and the girls have been educated by private tutors and in girls' schools. At the present time two sons are lawyers, one a minister, one a professor, one a civil engineer, and one a farmer. The education of the children has cost the farm about \$10,000. During the time the children were being educated there was no income except from the farm. At the present time these sons and daughters are profitably employed in honorable and useful occupations. While but three remain on the farm, one son and two daughters, all are following their present callings with the end in view of using farms on which to make their homes.

Each year all members of the family, including grandchildren, spend their vacations on the farm. This is usually in harvest and haying time, so that no extra labor is hired during these farm operations. The father declares that he has improved in health every year since coming on the farm. Now

76 years of age, he superintends all farm operations and knows the details of everything that is going on. He still enjoys good health and is fairly strong, being able to walk to every part of the farm. It must be remembered that he came on the farm long after most farmers begin to think of retiring, being then 60 years of age.

The farm work is not regarded as drudgery, and there is an atmosphere of refinement about the home that indicates a wholesome life on the part of the family. Everyone on the farm operations go on in a businesslike manner, but no one is rushed or overworked. The mother is well preserved and vigorous, with no trace of overwork, though she has always been active in the management of the home and farm. She believes that the farm life, on the whole, has been easier for her and more enjoyable than the life in the city. Every member of the family is in love with farm life and expects to live on a farm when conditions permit.

Social and Agricultural Problems Satisfactorily Solved

(1) A professional man, with no previous experience as a farmer, with a large and expensive family, is able to rear and educate his children on the income of a well-located farm of 380 acres of good land with a modernized dwelling upon it. On a salary of \$3,000 in the city the same amount of money could not have been expended on their education and a fair standard of living maintained. This fact is indicated in the inventory of 1892, which showed the present worth of the family to be \$11,026, about \$5,000 of which represented the savings of 22 years, the remainder being inherited. The present worth of the family, as indicated by the farm in 1906, was \$37,532. About \$10,000 of this increase in present worth is due to increase in land values. This leaves nearly \$12,000 of present savings during the period when the children were receiving their education.

Business training and experience have been important factors in the success of the farm. The father, who, at the age of 76, has kept in touch with all the farming operations, has been a soldier, a lawyer, a city official, and a city as a lawyer in Chicago. He has taught his sons how to economize and how to manage a business, and has taught them the value of a dollar. He has taught them the value of a dollar, and has taught them the value of a dollar.

A fact of particular interest is that the results were accomplished by the use of established methods of farming. The yield of wheat above the average for the community is due to more thorough tillage methods, but to extraordinary yields are recorded. The diary keeps the farmer and the home as a better show business and foresight in adjusting crop and farm operations, although adjusted to the comfort and tastes of the family, have been conducted strictly on economic principles. From this standpoint a problem of great interest and importance has been worked out on this farm.

Better Opportunities

(2) The members of the family believe they have had more opportunities in the way of general culture gained by travel, etc., than would have been possible for them in the city. Socially, they think there has been no essential loss; in fact, it is quite probable that the farm life has given better opportunities for culture of the most wholesome kind than the city would have afforded.

(3) The labor problem has been satisfactorily solved on this farm. With such wages as the farm could pay, the laborers have been able to accumulate sufficient property in a few years to take up farming for themselves. At the same time the women of the family have been relieved of extra work and responsibility necessarily attending the boarding and lodging of laborers; also the family life has been more homelike. The service secured in this way has been good, and on the whole the relations between employer and employed have been remarkably satisfactory.

An Acre Garden Pays Table Expenses

(4) It has been found practicable and beneficial to train the children through occupations which require them to assume responsibility. As an inducement to make the chosen line interesting and as an incentive to industry, the profits of the industries on the farm went to the children managing these de-

Condition of Farm—Plain Statement

partments. It is the testimony of all who know the family that the children are all efficient managers.

(5) It has been demonstrated on this farm that an acre garden, without any particular specialization in crop methods, can be made to pay the expenses of the table for a large family.

(6) The value of agricultural literature to the farmer is clearly demonstrated on this farm. Asked what benefit such literature had been to him, the father replied: "I would have been blind without it." The knowledge of spraying for San Jose scale saved a valuable orchard which is today the most profitable part of the farm. Fifteen or twenty well-chosen works on farming, with selected bulletins from State experiment stations and from the United States Department of Agriculture, constitute an important part of the farm library. Several standard agricultural papers are also taken.

A Serious Problem

Since 1905 there has been a marked increase in the income of this farm, due principally to the apple crop. About the same time a sharp advance took place in the price of field crops and of live stock, and these prices have advanced since. As a result of these conditions the net income for 1909 was \$5,197.50, the largest in the history of the farm. That the advance in income is not due, however, to increased productivity of the soil is disclosed by the records of the farm. An examination shows that wheat has decreased in yield per acre to a marked extent during the last half of the seventeen years. The average yield of this crop during the first half of this period was 21 bushels, and during the last half 15 bushels per acre. Corn, however, made an average of 35 bushels per acre during the first period of eight years and 43.5 bushels during the last nine years. On the other hand, clover and timothy have about held their own in yield during the entire period, the average being about 1 1/4 tons per acre. The increase in the yield of corn may be accounted for largely by an important change in the method of tillage. The proprietor of the farm now gives corn shallow cultivation during the last two times, whereas formerly he followed the usual custom of cultivating deep at all times and "hilling up" the corn at the last cultivation. This method of cultivation, together with an increase in the depth of plowing, which is now 9 to 10 inches, has greatly increased the yield of corn. It is to be noted also that a small quantity of lime, 300 to 400 pounds per acre, was put on the land at intervals with beneficial results to clover and thus indirectly to corn.

A statement in a letter received from this farmer shows that the soil has been held up to a normal standard of productivity with great difficulty and is in danger of decline. He says: "We are not getting the results for our labor and land that we should. I think we must work out a rotation that will give us larger yields of wheat. This, I think, can be accomplished by getting rid of the sorrel in our land and growing more clover and other leguminous crops. The wheat crop is the measure of all other values as a rule, and if we can grow more and cheaper wheat it will do more to reduce the cost of living than almost anything else."

This farm has a very good financial record, due to intelligence and the application of business methods in management. But one of the essential factors in the management of a farm is maintaining or strengthening those soil conditions which are favorable to the production of such value-producing crops as it seems desirable to raise.

If such conditions are not maintained certain weed pests, which find the soil favorable, come in and take the place of cultivated crops. The farmer is often misled by this fact and regards the presence of weeds as the direct agent preventing the vigorous growth of crops, whereas the real cause may be the lack of a proper environment for the crops. For this reason attempts are often made to subdue weeds by cultivation alone, which is only partially successful and adds unnecessary expense.

The fact that sorrel is a persistent and troublesome weed on this farm is evidence that fundamental conditions of soil are defective and that other methods besides cultivation must be planned to subdue it and allow the desirable crops to take its place.

It is suggested, therefore, that a rotation of crops and some system of cultivating the soil be adopted which will build up and maintain the land in a condition which will better enable the cultivated crops to combat the weed enemy in the struggle to possess the soil.

The practice of liming the soil is found to be beneficial in this region, stimulating the growth of

clover and thus tending to eliminate the sorrel. On this farm lime could be applied at little expense, since in many places limestone rock crops out at the surface. This rock could be blasted out and either ground or burned to be scattered on the land. This could be done at shorter intervals than formerly or a heavier application made of 1,000 or 2,000 pounds to the acre.

Besides the use of lime and commercial fertilizer the following rotations are suggested, the practice of which would speedily supply humus and nitrogen, materials which are essential in maintaining the soil in a condition favorable to field crops:

Corn plus crimson clover or rye and hairy vetch

Cow-peas.

Wheat.

Hay (6 pounds of clover seed the following spring).

Pasture.

Crimson clover has not generally proved successful here and should be tested on a small area before sowing a large quantity. Three conditions at least are essential for a satisfactory growth of crimson clover. The soil must be inoculated with the proper bacteria. It must contain a fair amount of humus and nitrogen, and the seed must be sown sufficiently early in order to make a vigorous growth before winter.

Lessons Learned on This Farm

Rye and hairy vetch are adapted to more general conditions, may be sown later than crimson clover, and will grow under conditions that will not produce crimson clover. It is essential that the land be artificially inoculated for hairy vetch unless the bacteria are known to be in the soil. The 6 pounds of clover seed to be sown the spring following the hay crop are essential in getting a stand of clover to plow under the next year for corn.

Alfalfa may be grown successfully on clean and fertile land in this region. When these conditions can be met, the following rotation is advised:

Corn plus crimson clover or rye and hairy vetch.

Cow-peas.

Wheat.

Alfalfa.

Alfalfa.

Alfalfa.

On land that is fairly rich in nitrogen and humus, if the problem were simply to maintain fertility, a shorter rotation could be adopted by cutting out one year of wheat on this farm, making it a four-year rotation, which would have the effect of growing more legumes. It has been demonstrated that such a rotation as this would gradually increase the nitrogen and humus content of the soil. Minnesota Agricultural Experiment Station gives the results of experiments carried on in several places through a series of 10 years with a rotation of corn, wheat, hay, and pasture, and it was found that the humus and nitrogen could not only be maintained but increased.

Farm Implements and Their Cost

The following is a complete list of the machinery and implements used on the farm described and their cost:

1 seven-foot-cut wheat binder.....	\$ 135
1 six-foot-cut wheat binder—old—for use in case the other gets out of repair.....	100
1 five-foot mower.....	35
1 four-foot mower.....	30
1 manure spreader.....	80
1 ten-spout wheat hoe drill.....	75
1 eight-spout wheat disk drill.....	60
2 disk harrows (one tongueless).....	50
2 spring-tooth harrows.....	27
2 spike-tooth harrows.....	24
2 two-horse chilled plows.....	12
2 three-horse chilled plows.....	50
2 walking wheeled double cultivators.....	50
4 double-shovel plows.....	10
1 double smoothing harrow.....	12
1 two-row disk corn planter.....	40
1 single-row corn planter.....	12
1 iron roller.....	12
1 plank drag.....	2
1 hay loader.....	2
1 side-delivery horse rake.....	40
1 single-horse cultivator.....	14
2 four-horse wagons.....	120
1 two-horse wagon.....	50
2 road beds for wagons.....	40
2 hay racks.....	20
1 steel spring-tooth hayrakes (10 feet).....	20
1 spring tooth weeder.....	9

\$1,105

HASTENS THE HARVEST FINISH

BINDER AND LOADER

DO WORK OF SEVERAL MEN

These Are Among the Larger of Farm Implements



A modern self-binding harvester. One man cuts and binds all of the grain and carries the bundles into windrows. One man can shock the grain after the harvester. Two men in this way do the work of the six that were required to operate the old style reaper.



VALUE OF VARIOUS FOODS COMPARED WITH HAY

Value of Hay as Food

Table showing amount of hay or its equivalent per day required by each 100 pounds of live weight of various animals:

	Pounds
Working horses.....	8.08
Working oxen.....	2.40
Fattening oxen.....	5.00
Fattening oxen when fat.....	4.00
Milk cows.....	2.25 to 2.40
Dry cows.....	2.42
Young growing cattle.....	3.08
Steers.....	2.84
Pigs.....	3.00
Sheep.....	3.00

It has been estimated that one hundred pounds of good hay will possess the same feeding value as

Wheat.....	44 1/2
Corn.....	62 1/2
Clover, Red, Green.....	378
Beets.....	609
Beans.....	28
Barley.....	66
Carrots.....	571
Oil Cake, Unseed.....	48
Buckwheat.....	74 1/2
Oats.....	69
Rye.....	53 1/2
Potatoes.....	340
Peas, dry.....	37 1/2
Oat Straw.....	347
Clover, Red, Dry.....	88
Turnips.....	403
Carrot leaves (tops).....	125
Rye Straw.....	420

Average Period of Gestation

The period of gestation in animals varies considerably, but the following is an average period based on a long series of observations:

Elephant.....	2 years
Camel.....	11-12 months
Ass.....	12 months
Mare.....	11 months
Cow.....	9 months
Sheep.....	5 months
Goat.....	5 months
Pig.....	3 1/2 months
Horse.....	11 months
Cat.....	6 weeks
Guinea pig.....	65 days
Rabbit.....	30 days

**DOES NOT
TEAR SOIL**

NEW FARM IMPLEMENT

**CUTS SOIL
IN PIECES**

Unlike Tooth Harrow, the Disk Pulverises Soil by Cutting



The Disk Harrow

By Henry Wallace, Editor "Wallace's Farmer," Des Moines, Iowa

The to us unknown man who invented the disk, which slices the plowed soil instead of tearing it to pieces with the harrow, deserves a monument higher than erected in Washington in memory of the Father of his Country. He ranks with that other unknown man who invented the knife to cut his meat, rather than tear it to pieces with his fingers and his teeth. Each of them builded better than he knew, and deserves the thanks of posterity while grass grows and water runs. The disk implements, whether harrow, cultivator, grain drill or roller, are revolutionizing modern agriculture.

The disk harrow, properly used on corn-stalk ground, at once acts as a stalk cutter, levels the surface, and forms a proper seed-bed for spring grain in the states that are subject to deep winter-freezing, without breaking the capillary connection between the seed-bed and the under-soil. In corn-stalk lands which need plowing for spring grain, previous disking prevents clod formation and restores capillary connection by providing a mulch of loose dirt, which fills up the spaces made by the plow, espe-

cially if disking follows the plow, which it should always do. If corn is to be followed by corn, the disk should always precede the plow, thus cutting the corn-stalks, preventing clod formation by preserving moisture, and providing a mulch of loose dirt that will fill up the air spaces left by the plow and germinate the weed seeds near the surface, to be killed when plowed under. The disk should follow the plow; and if the harrow follows at right angles you have the best seed-bed for corn possible on that kind of land.

Where sod is to be plowed for corn in the fall, running the disk perpendicularly or straight, thus slitting the sod, renders the plowing much easier and in the spring requires less work to settle the furrow and restore contact with the under furrow, thus restoring capillary connection with the under-soil. Whether plowing in the fall or spring, the disk should run with the furrow. In preparing the seed-bed, if a second disking is necessary it should be at right angles.

Antidotes for Poisons

The first thing to do in most cases is to induce vomiting, if possible. Give an emetic, a tablespoonful of powdered mustard in a tumbler of warm water is good. Warm water and salt is also efficacious.

For Poisoning from Opium, Laudanum, and Morphine: An emetic should be followed by strong coffee or the white of an egg. Keep the patient walking for two or three hours.

For Poisoning from Arsenic, Corrosive Sublimates, Verdigris,

Blue Vitriol, and Vegetables Kept in Copper Vessels: Give an emetic and the white of an egg, sweet oil and milk.

For Sugar of Lead Poisoning: Give an emetic and epsom salts.

For Poisoning from Hemlock, Aconite, Belladonna, and Foxglove: After emetic give tannin and stimulants.

Strychnine: First give an emetic, and then large dose of bromide of sodium (60 grains in solution). Repeat every hour until three or four doses have been taken.

Toadstool Poisoning: Give emetics promptly and then castor oil and stimulants. Apply heat.

Poison Ivy or Oak: There are three generally effective remedies for poison ivy or mercury. One is to apply hot water to the poisoned surface. Another is peroxide of hydrogen. The third is to apply a solution of sugar of lead about 40 grains to a pound of water. Two other remedies that are more or less effective are baking soda and dry starch.

Terms Used in Consideration of Fertilization, Grains, Etc.

Acid phosphate or superphosphate of lime, is finely-ground, raw, rock phosphate mixed with about an equal weight of sulphuric acid. The acid phosphate is more soluble in water and thus more readily assimilated by plants than raw phosphate applied as a fertilizer.

Aftermath, A second crop of grass in the same season; rowen.

Albuminoid nitrogen is nitrogen in the form of albuminoids, which is the name given to one of the most important groups of substances classed together under the general term protein. The albumen of eggs is a type of albuminoids.

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Alkali soils.—Soils found in arid or semi-arid regions, which contain an unusual amount of soluble mineral salts (alkali), which effloresce or bloom out in the form of a white powder or crust in dry weather following rains or irrigation. Two distinct classes of alkali are known: White alkali, composed largely of sulphate of soda and common salt, which is comparatively harmless; and black alkali, composed largely of carbonate of soda, which is highly corrosive and destructive to vegetation.

Alkaloids are a class of bitter, nitrogenous constituents of plants which have active medicinal or poisonous properties. Quinine, morphine, strychnine, etc., are alkaloids.

Amid nitrogen is nitrogen in the form of amide, one of the groups of substances classed together under the general term protein. Amide, unlike albuminoids, are usually soluble in water, but are generally considered of less value as food than albuminoids.

Ammonia is a compound of nitrogen more readily available to plants than organic nitrogen. The most common form is sulphate of ammonia, or ammonium sulphate. It is one of the first products that results from the decay of vegetable or animal substances.

Ammoniated superphosphate is the trade name for a mixture of a superphosphate with some material supplying nitrogen.

Analysis is a separation into constituent parts.

Annals are the plants which last but a year. The seed, planted in the spring, in one season develops into a mature plant which produces its flowers, fruit, and seed, and dies in the fall. The annuals must be renewed each year, and most of them thrive best where there is no shade. Sweet peas and Indian corn are examples of the annuals. The word annual comes from the Latin word for year—*annus*; the name biennials—two-year plants—is from the same word with "bis" twice; while the perennials—living on from year to year—have the same root-word with "per" in the sense of through all the years.

Ash is what is left when the combustible part of a feeding stuff is burned away. It consists chiefly of lime, magnesia, potash, soda, iron, chlorine, and carbonic, sulphuric, and phosphoric acids, and is used largely in making bones. Part of the ash constituents of the food is stored up in the animal's body; the rest is voided in the manure.

Atomic Theory is the doctrine that an element is composed of infinitesimally small particles to which the name *atom* is given. The atoms of different elements combine in certain definite proportions to form chemical molecules. Thus water, which chemically is represented by the symbol H_2O , meaning that oxygen and hydrogen combine to form water in the definite proportion of two parts of hydrogen to every one part of oxygen.

Available phosphoric acid is the soluble and reverted taken together.

Babcock test. A method for rapidly determining the fat contents of milk by the use of chemical reagents. Invented by Dr. S. M. Babcock, of the Wisconsin Agricultural Experiment Station. The little machine for applying this test is made in several patterns, the principle applied in all is the use of centrifugal force, aided by some chemical agents, notably sulphuric acid. The handling of the machine can be readily learned by a careful person.

The milk or cream to be tested is measured in a pipette and placed in a bottle which has a long, slender, graduated neck, sulphuric acid is then added, and the bottle shaken a few moments until the mixture becomes dark colored. The acid, without affecting the fat, dissolves the other milk solids, which keep the fat globules apart. The bottle is then placed in the machine by which it is rapidly revolved with the neck toward the centre. The fat is thus forced toward the neck by the other contents of the bottle, which are heavier and therefore thrown away from the centre.

Bacterium (plural, *Bacteria*) is the name applied in common to a number of different or closely related microscopic organisms, all of which consist of single short cylindrical or elliptical cells or two such cells joined end to end and capable of spontaneous movement. Many kinds of bacteria are harmful and cause diseases and other injurious effects, but many are beneficial. Among the latter are those which give aroma to tobacco and flavor to butter and cheese; and those which enable leguminous plants to use the free nitrogen of the air.

Barkbound. Having the bark too firm or close, as trees; this disease is usually cured by slitting the bark.

Biennials. A biennial plant is one which takes two years to develop flower and fruit. The first year the seed is planted the root and leaves are formed; the second year, flower and seed; the plant then dies. The following are an illustration of the biennials.

Boll weevil. A small insect which in its larva state feeds within the bud or boll of cotton. This grub is less than a quarter of an inch in length, is of white color, and without feet; developing in two weeks into the adult state, when it becomes a hard-shelled insect with a head prolonged into a slender snout that conceals the jaws with which the weevils puncture the surface of their food supply.

Bordeaux mixture is a mixture of copper of sulphate, freshly slaked lime and water. It is used as a fungicide and also to prevent attacks of some insects.

Brown rot is a disease which appears first as a small, dark brown decayed spot on any half-grown stone fruit such as the peach or the plum, usually causing the fruit to shrink and wither. The disease is caused by a fungus growth and the twigs of apricots and peaches may be blighted by this disease entering from the affected flower or fruit.

Buddling. The insertion of a bud of one tree under the bark of another, for propagation. It must be done during the growing season.

Butter-fat.—The oleaginous globules in milk surrounded by casein, from which butter is made in the process of churning. A pound of butter contains about 14 oz. of butter-fat.

Buttermilk.—That part of milk which remains after the butter is extracted.

Calyx.—The outermost series of leaves (called sepals) of the flower, usually green, but sometimes colored.

Carbohydrates.—The nitrogen-free extract and fiber are often classed together under the name of carbohydrates. The carbohydrates form the largest part of all vegetable foods. They are either stored up as fat or burned in the body to produce heat and energy. The most common and important carbohydrates are sugar and starch.

Cat's Tail Grass. Another name for timothy or herd's grass, so called from the shape of its heads.

Cellulose is the chief constituent of crude fiber.

Chard Beet. A variety of which only the leaves are used, boiled as Spinach. The Swiss Chard is one of the principal vegetables of the laboring classes of Europe.

Chemical Analysis of Soils. An analysis to find the constituent elements in any given soil which may indicate what the soil needs. If a very marked difference exists in a soil derived from limestone and a soil derived from sandstone. In soils of similar character analyses are seldom of much value because difference of fertility is either due to variations too minute for ordinary analysis to determine, or else is due to causes not connected with the amount of plant food.

Chlorophyll.—The green coloring matter of plants. By the combined action of chlorophyll and sunlight plants are able to

Technical Terms—Continued

build tissue from the carbon dioxide and water of the atmosphere.

Citrus fruits. The citron tree is a tree bearing fruit resembling a lemon; it gives its name to the family of citrus fruits which comprise the lemon, lime, orange, grapefruit, shaddock, and citron.

Clay. The name given to various earths.

Complete fertilizer is one which contains the three essential fertilizing constituents, i. e., nitrogen, phosphoric acid, and potash.

Conidium (plural Conidia) is one form of spore or reproductive body of fungi.

Corn is the name used in Europe as a general term for all cereals. This is the sense in which the word is translated in the Bible when it speaks of Jacob's sons saying, "There is corn in Egypt." The word originally meant any hard, edible seed, grain, or kernel. The colonists found this plant, properly called maize, cultivated by the Indians, and used the name Indian Corn to distinguish it from other corn of the mother country. In Latin America—Mexico, Porto Rica, etc.—"maiz" is the term generally used.

Corn Smut. A cancerous outgrowth with a thin covering over black, dust-like masses, that occurs on various parts of the growing corn, notably the ear and tassels. Well manured soil favors the growth. Frequent spraying of stalks and ground with a fungicide will prevent spreading but is expensive. The most efficient and economical method of prevention is by the collection and burning of all smut masses before they ripen and scatter their spores.

Corn tassel. The perden inflorescence at the top of a stalk of corn; also the silk protruding from an ear of corn. Corn is fertilized by the pollen from the tassel on the stalk applied to the silk. The tassel at the top is formed of many flowers which usually contain only stamens—the young ears bear the pistils, which are the so-called silk.

Corolla.—The inner circle or set of leaves (called petals) of a flower, usually bright colored.

Corrosive sublimate is a very poisonous compound of mercury and chlorine, used as a fungicide.

Cotton boll. The large capsule into which the pistil of the cotton flower develops. It is about the size and somewhat the shape of a hen's egg, except that it is distinctly pointed at the free end. When ripe the bolls open, disclosing the dark seeds covered with the pearly white fibres for which the cotton-plant is cultivated. Different varieties of cotton require from 50 to 65 bolls to make a pound of cotton.

Cream.—The richer and butyric part of milk, which, when the milk stands unagitated in a cool place, rises and forms a scum on the surface.

Cream Separator. A machine so constructed that the butter-fat or cream in milk, by rapid agitation, will be thrown to one side so separated from the milk that it will flow in separate stream, the milk from the machine flowing in another stream.

Cross-pollination, as here used, means the conveying of pollen to pistils of flowers of a plant of an-

other variety. In case of plants propagated by seeds it also means the transfer of pollen to a pistil of another plant of the same variety.

Culm.—The stem or straw of grains and grasses.

Culture, as here applied to bacteria or other organisms, is the product of their growth under artificial conditions.

Deciduous trees. Trees that shed their leaves in the autumn.

Denitrification is the process, due to microorganisms, by which the readily available nitrates are converted into less valuable forms of nitrogen.

Dent corn. A variety having the kernel furrowed or depressed at the large end; the common kind.

Diffusion residue, or beet chips, consists in the residue of the beet after extraction of sugar at the sugar factories under pressure in the diffusion batteries.

Digestible matter is that portion of the food eaten which is actually digested. The rest is excreted and is of no aid in nutrition.

Drupe.—A fruit consisting essentially of a hard-shelled nut or stone surrounded by a fleshy pulp, as the peach, plum, cherry.

Dry Matter is the portion remaining after excluding the water.

Eau celeste is a solution of copper sulphate in water to which ammonia is added, and it is used as a fungicide.

Ether extract is the same as the fat or crude fat of feeding stuffs.

Eucalyptus. The botanical name for the burning bush or spindle tree; the native American species is the well-known Weehoo tree with its red berries which stay on the tree all winter.

Eurochorda (Pearl Bush). The name refers to the cords by which the seeds are suspended. A beautiful hardy tall-growing shrub or tree, introduced from China, as yet comparatively little known. It is propagated by seeds, layers, and suckers, and is suitable for parks and private grounds in sections east of the Mississippi and north of the Ohio.

Exogens. Plants that increase their growth by adding successive layers to the outside as the oak tree, whose annual growth can be noted when the trunk is sawn across, by the distinctly marked series of rings, each of which marks a year's growth. Most of the primary plants are exogens.

Fat, or the materials dissolved from a feeding stuff by ether, is a substance of mixed character and may include, besides real fats, wax, the green coloring matter of plants, etc. The fat of food is either stored up in the body as fat or burned to furnish heat and energy.

Feeding standards are statements of the approximate amounts of digestible protein, fat, carbohydrates, etc., adapted to animals under different conditions.

Fecundation is the action of pollen upon the ovules, rendering them capable of becoming seeds.

Fiber, sometimes called crude cellulose, is the framework of plants, and is, as a rule, the most indigestible constituent of feeding stuffs. The coarse fodders, such as hay and straw, contain a much larger proportion of fiber than the grains, oil cakes, etc.

Flow pipes and returns.—In the heating systems of greenhouses it is a common practice to have one of two main pipes, known as flow pipes, to supply the steam or hot water to the house. These pipes frequently run the full length of the house and then unite with smaller pipes known as return pipes, or "returns" which carry the hot water or steam through the house and back to the boiler.

Fodder, when applied to corn, is the plants, including the cobs, which have been cut and field-cured. The residue, after the ears have been removed is properly termed **Stover**.

Formalin is a 40 per cent solution of formaldehyde, used as a disinfectant, preservative, etc.

Fungus (plural, Fungi) is a form of plant life destitute of green coloring matter; molds and mushrooms are familiar examples. Many diseases of plants are due to fungi.

Fungicide is a substance used to destroy fungi or prevent their growth.

Garden bed. A plot or piece of ground in a garden, usually a little raised above the adjoining level.

Gluten is the name given to one of the most important of the nitrogenous substances classed together under the general term "protein." "Wheat gum," obtained by carefully chewing wheat, is a familiar example. It is the gluten of flour that gives consistency to the dough.

Heavy Soil. A soil that is moist, deep, soft, or miry, as a clay soil.

Hessian fly. One of the most destructive of the 100 species of insects which prey upon the wheat. Its ravages may be recognized in the early spring the wheat is noticed falling down uncontrollably. This small, two-winged insect, belongs to the same order as the mosquito and the common house-fly—known as Diptera. It deposits its eggs between the sheath and the stem of wheat at the base of the stock, and the larvum, which resembles a Hessian fly in form and color, hatching out in a few weeks' time, feeds on the tender wheat stem, cutting it off near the ground.

Humus is the name applied to the partially decomposed organic (animal and vegetable) matter of the soil. It is the principal source of nitrogen in the soil.

Hygroscopic water. The water lost and gained by a soil through artificial drying. Not the moisture naturally removed by drainage or by evaporation; these are called the first "drainage water," and the last "capillary water" since it is the surface by capillary attraction.

Indian Meal is the meal of maize, or Indian corn; corn meal.

Inoculation is the introduction of bacteria or other organisms into surroundings suited to their growth with a view to producing the effects which are the result of their activity.

Internode.—The part of the stem between the nodes.

Intercultural tillage means tilling the soil while the plants are growing. It is done primarily to kill weeds. It also lets in a rain more freely to the roots of the plant, and, in dry places, prevents the evaporation of water.

Technical Terms—Continued

from the surface. The inter-cultural tillage of corn should be shallow, not more than two inches deep near the plant, since any breakage of the roots of corn is injurious, and the most of the roots lie from two to four inches below the surface and six inches from the plant. Three to five cultivations of corn are usually enough; nothing is gained by cultivating corn after the plant is three to four feet high, provided the land is free from weeds. Farmers refer colloquially to this stage as "when the corn is laid-by."

Kainit is an impure form of potassium sulphate and ordinarily contains about 12 to 20 per cent of potash.

Lactation.—The formation or secretion of milk. The "period of lactation" as applied to cows means the length of time since calving that they have been giving milk.

Lard is obtained from the fat of swine when it is heated to a boiling point and then strained.

Layering. Method of propagating woody plants by bending down branches and burying in adjoining soil.

Legume. Any plant belonging to the pea family, including the leguminous forage crops, alfalfa, Japan clover, the soy bean, cowpea, velvet bean, and vetch. The leguminous crops, including the clovers, are valuable as fertilizers in that they add nitrogen to the soil in a form easily available for the crops that are planted after them.

Legume seeds are always found in a pod which contains one or more seeds; their peculiarity is that while other seeds have a small embryo the seed-coat of the legume is entirely filled by the large embryo. They are exceedingly rich in nitrogen.

Leguminous plant is a plant of the botanical order Leguminosae, the more common representatives of which are clover, peas, beans, etc.

Light Soil. One that is loose, easily pulverized.

Lime is, strictly speaking, calcium oxide, a combination of calcium and oxygen.

Liquid-amber. A genus of trees of the witch-hazel family. It is found in Mexico and the United States and is known as the sweetgum, in this country. Its home extends from the Rio Grande to the Potomac.

Loose Land. The Agricultural Department name for stump land, where the trees have been felled and the stumps left.

Loam. A natural mixture of sand and clay with organic matter (decayed vegetable or animal substances); a species of earth or soil readily fusible in water.

Mellilotus. A genus of the leguminous plants, the sweet clovers. They are natives of southern and central Europe and western Asia. White mellilot has been recommended as a fodder plant under the names of Bokhara clover and "but clover." This variety (*Mellilotus alba*) is common along our roadsides and is sometimes cultivated as a forage crop for bees. The very name mellilotus comes from the Greek word for honey, "mell" and "lotos."

Micro-organism, or microscopic organism. is a plant or animal too small to be seen without the aid of a compound microscope.

Milo maize. A name given in some localities to Kafir corn, which is also known as Egyptian rice corn, dhura, African millet, Jerusalem corn, and Guinea corn.

Mulching, covering the surface of the soil by a layer of straw, shavings, leaves, tanbark, manure, or other matter, to reduce evaporation and so keep the moisture beneath the surface.

Narrow ration is one in which the ratio of protein to other constituents is narrow, i. e., one comparatively rich in protein.

Nitrates furnish the most readily available forms of nitrogen. The most common are nitrate of soda and nitrate of potash (saltpeter).

Nitrification is the process by which the highly available nitrates are formed from the less active nitrogen of organic matter, ammonia, salt, etc. It is due to the action of minute microscopic organisms.

Nitrogen exists in fertilizers in three distinct forms, viz., as organic matter, as ammonia, and as nitrates. It is the most expensive fertilizing ingredient.

Nitrogen-free extract includes starch, sugar, gums, and the like, and forms an important part of all feeding stuffs, but especially of most grains.

Node.—That part of the stem (usually somewhat enlarged and hardened, especially in grains and grasses) to which the leaves are attached.

Nutritive ratio is the ratio of the digestible protein (taken as 1) to the other digestible materials of the food. Thus, if a ration contains one part of protein for every five parts of the other digestible materials, the nutritive ratio is 1:5.

Oleomargarine is made from various mixtures of oleo oil, cottonseed oil, neutral lard and milk or butter. It is nutritious and sometimes passes under the head of "butterline."

Organic matter is the dry matter less the ash.

Ovules are bodies which, when acted upon by pollen, become seeds.

Osmosis is the impulse or tendency of fluids to push their way through porous matter which separates them, and mix together. Exosmosis is the passage of liquids or gases or vapors from within outward and endosmosis is the similar passage of a fluid substance inward. Largely used in speaking of the passage of fluids, whether watery or gaseous, through the separating tissues of plants.

Pasteurized milk or cream is that which has been heated to a temperature (about 155° F.) which does not kill all the bacteria, but only those which are in a vegetating condition and ready to begin their activity at once.

Perennial. Literally, lasting through all the years. The perennial plants, once planted, continue their growth year after year, as the lilacs, or the garden sage. Those perennials which shed their leaves in autumn are called deciduous; those which keep their leaves through the winter, evergreen.

Perennial grasses are, practically, the meadow grasses. They propagate themselves from year to year, increasing by new culms which soon become independent

plants. Timothy is not, strictly speaking, a perennial, but an annual. However, under favoring circumstances, by seeding itself yearly the same result is attained.

Peruvian cotton, as its name implies, originated in Peru, but it is raised largely also in Brazil. It is a perennial plant; however, only the growth of the second and third years is utilized. The staple lint is mostly shorter, coarser, and more wiry than American upland cotton.

Phosphoric acid, one of the essential fertilizing ingredients, is derived from materials called phosphates. It does not exist alone, but in combination, most commonly as phosphate of lime in the form of bones, rock phosphate, and phosphatic slag. Phosphoric acid occurs in fertilizers in three forms—soluble, reverted, and insoluble phosphoric acid.

Pistil is the ovule-bearing organ of the flower. It is often called the fertile or female organ.

Pollination of corn. Corn is wind-fertilized, since the extremely abundant pollen—estimated 9,000 pollen grains for each grain of corn—is carried long distances by wind and often is deposited on silks remote from the tassel bearing the pollen.

Potash, as a constituent of fertilizers, comes in a number of forms, but chiefly as chloride or muriate and as sulphate. All forms are freely soluble in water and are believed to be nearly, if not quite, equally available, but it has been found that the chlorides may injuriously affect the quality of tobacco, potatoes, and certain other crops. The chief sources of potash are the potash salts from Stassfurt, Germany—Kainit, sylvinite, muriate of potash, sulphate of potash, and sulphate of potash and magnesia. Wood ashes and cotton-hull ashes are also sources of potash.

Process butter is made by treating old or rancid butter by melting, skimming and allowing the brine and curd to sink to the bottom, whence it is drawn off. Air is then blown through the melted butter-fat and the product is churned with milk or cream. It is then considered "renovated," by which name it is sometimes known.

Protein (nitrogenous matter) is the name of a group of substances containing nitrogen. Protein furnishes the materials for the lean flesh, blood, skin, muscles, tendons, nerves, hair, horns, wool, casein of milk, albumen of eggs, etc., and is one of the most important constituents of feeding stuffs.

Pure culture is a culture containing one kind of organism. Pure cultures of yeasts are used in wine making, and pure cultures of bacteria are used in butter and cheese making, and for other purposes, to insure a uniform product.

Rice birds are the same birds which in the earlier months of the summer delighted the ears of Northern farmers with their song, and gladdened his eye with their bright plumage. In their Southern migration they reach the rice fields in time to glut their appetites on the ripening grain and prove themselves a pest in the paddy-field; so much so that men and boys, called "bird minders," are hired to drive them away. They are called rice-birds, also, from their feeding-grounds.

Technical Terms in Agriculture—Continued

Stubble-field left unplowed until late in the autumn, that it may be cropped by cattle. The second growth of grass in a season after the hay has been cut.

Sainfoin is a valuable forage plant of the order of legumes; it is a small perennial shrub, native of western Asia and northern Africa, hence thrives in the light, dry, sandy, or calcareous soil found in our Southern or Western States. Its long taproot, descending deep for moisture, enable it to withstand long-continued droughts at the same time bringing up from the depths nutriment for the crops that follow and rendering the subsoil loose and porous for subsequent cultivation. The sainfoin is very nutritious and whether fed green or made into hay is greatly relished by all domestic cattle. It is said to be the favorite food of the ass and from this takes its botanical name, *Onobrychia*—onos, the ass, and brycho, to bray. Sainfoin will crop seven to ten years, according to the nature of the soil, but its yield is greatly increased by top dressing.

Sea Island Cotton is a variety of cotton found in the West Indies when Columbus discovered America. The plants differ from the upland cotton in their larger growth, 5 to 8 feet high, with longer and more flexible branches and more deeply lobed leaves. Instead of being white the flowers are bright yellow, the bolls are sharp-pointed and have three instead of four lobes. It is grown in the U. S. chiefly on islands and adjacent mainlands of South Caro-

lina and Georgia. Sea Island Cotton commands a higher price in the market, but it yields less an acre and costs more to pick and gin than ordinary varieties.

Setting Hen. A hen which gives attention to incubating eggs.

Specific gravity of solid substances is the ratio of the weight of a given bulk of the body to that of an equal bulk of water; or stated in another way, the ratio of the weight of the substance in air to its weight in water.

Sporo is a minute body, borne by a fungus, which is capable of reproducing the fungus directly. It corresponds in function with the seed of higher plants.

Stamen.—Part of a flower which produces pollen.

Staminate, producing stamens.

Soluble phosphoric acid is that form which is soluble in water and readily taken up by plants.

Subsoil. The bed or stratum of earth lying next below the surface soil. It does not usually contain plant food in a form ready to be taken by the plant.

Subsoil plow. A plow adapted to follow the common plow, and loosen the subsoil at the bottom of the furrow without raising it to the surface, in this way forming a porous foundation for the mold which will be turned upon it by the ordinary plow in its next furrow.

Sulphuric acid; oil of vitriol. A heavy, oily, very corrosive liquid (H_2SO_4) produced commercially by

burning sulphur in atmospheric air and passing the sulphurous acid formed into a lead chamber along with the vapor of nitric acid. It is the most extensively used of all the acids, and is the primary agent for obtaining almost all the others by disengaging them from their saline combinations. It is used in breaking up organic substances into their elements, as sugar; applied by Dr. Babcock in the standard "Babcock test" for separating the butterfat from milk.

Superphosphate.—In natural or untreated phosphates the phosphoric acid is insoluble in water and not readily available to plants. Superphosphate is prepared from these by grinding and treating with sulphuric acid, which makes the phosphoric acid more available to plants. Superphosphates are sometimes called acid phosphates.

Thrip. A genus of small, spotted flies, many of them destructive to plant life. One species is especially pernicious in the onion bed.

Till is the state of being prepared for a crop; tillage. In rare instance that which is tilled; the acre-ground.

Viscosity.—Stickiness; gumminess; the quality of matter having a thick or sticky consistency.

Water is contained in all foods and feeding stuffs. The amount varies from 5 to 15 pounds per 100 pounds of such dry materials as hay, straw, or grain to 80 pounds in silage and 90 pounds in some roots.

HYDROPHOBIA

Although this is not, strictly speaking, a technical term, it is a term often applied to a dog which, frothing at the mouth, is supposed to be dangerously mad.

Oftentimes this frothing is the result of exhaustion and over-hot. While it is necessary to be cautious and careful in confining the dog that exhibits these

symptoms, it is well not to kill the animal until the cause of its peculiar action is perfectly understood.

A frequent cause of unusual action on the part of the dog may be, and probably is, lack of water to drink.

Dog keepers should always keep a dish of fresh water accessible to dogs on the premises.

The Family Dog on the Farm

The origin of the dog is a much debated question, some considering the breed derived from the wolf, an opinion which is based on resemblances, the susceptibility which the wolf shows of being domesticated, the readiness with which the two animals breed together, the equal period of gestation, and their general appearance and similarity in structure.

Various attempts have been made to make a systematic classification of the varieties of dogs but without much success. One authority divides dogs into six groups, as follows: 1. Wolf dogs, including the Newfoundland, Esquimaux, St. Bernard, shepherd's dog, etc. 2. Watch dogs and cattle dogs, including the boarhound, the Danish dog, etc. 3. Greyhounds, the Irish hound, etc. 4. Hounds, the bloodhound, staghound, foxhound, setter, pointer, spaniel, cocker, poodle, etc. 5. Cur dogs, including the terriers and their allies. 6. Mastiff, including the different kinds of mastiffs, bull-dog pug-dog, etc.

The female has six to ten pups, and goes with young nine weeks as a rule. The young are born blind, their eyes opening in ten or twelve days. Their growth ceases at two years of age. The dog commonly lives about ten or twelve years; at the most twenty.

The dog's fidelity and affection endear him to the human family. As pets, dogs are highly valued. They are agreeable companions for children, a boy

playing with his dog getting a great deal of pleasure and a great deal of healthful exercise.

With careful training and under rigid restriction the dog may be of service on the farm; if rightly restrained and kept at home he may be allowed in suburban towns, but in cities and thickly settled regions he is out of place.

Wherever he is kept he should have a comfortable doghouse and be taught to stay there nights and at proper hours. He should be regularly and abundantly fed that he will not be compelled to wander about the neighborhood in search of food.

He should not disturb people by barking, and particularly should he not bark at pedestrians or passing teams.

To teach him not to chase cats, rabbits, squirrels or any little animals on the premises the master will break this habit with the aid of a handful of small pebble stones vigorously thrown with a sharp command to "stop it." Assisted by a quart of pea sized pebbles, a dog's bad manners and the quarrels of cats in the neighborhood may be abolished in a short time.

On the farm especially the dog may be trained to be of much service in watching property and guarding and driving animals. To be of use, he should never be allowed to form the habit of killing sheep and doing other mischief, the result of wandering away from home after dark.

VIEW OF GLASS FRAME

HOTBED

TOOLS IN USE ON THE FARM

Directions for Making a Hot Bed

A hotbed consists of a frame covered by a glazed sash. Heat is secured from a bed of fermenting manure set in the frame below the ground level. The plants are grown in soil placed to a depth of five to eight inches over the manure.

A cold-frame consists of four boards joined together to form a frame which is set upon the ground and covered with sash. The heat secured comes from sunlight only.

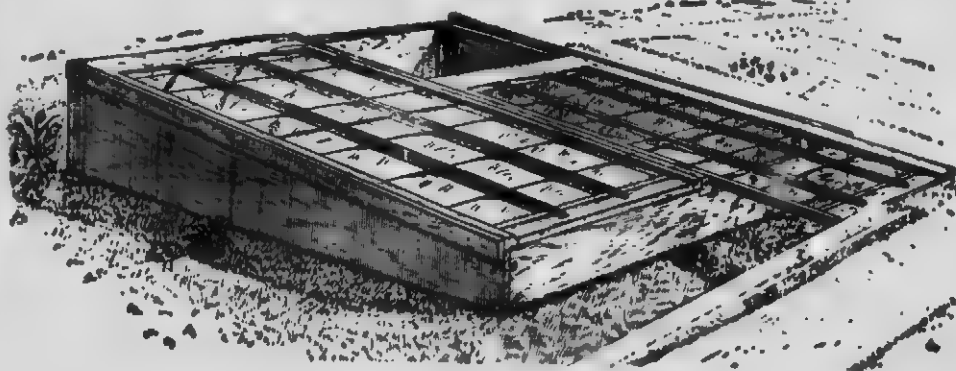
Hotbeds should be placed free from walls so there will be space on all sides. The pit is usually six feet by six feet, the frame requiring two sash, each three feet by six feet. A location facing the south or southeast should be selected, protected on the north and west by buildings, walls, or bushes. Frames should face the south and be placed so that no shade will fall upon them during the day. It is usual to dig the pit about eighteen inches deep and to use a subframe. Fresh horse manure containing plenty of straw is most desirable for use in the pit, as it gives a quick, intense heat. Before placing it in the ground it is best to prolong fermentation as long as possible by mixing it thoroughly every two or

three days while in the pile. When ready place it in the pit and tramp down thoroughly.

Before adding the soil the sash should be placed over the frame for three or four days while the manure reaches a good condition. When the soil is finally placed in the frame to a depth of from five to eight inches it should be allowed to remain for about four days until it becomes warm and the weed seeds germinate. It should then be carefully raked and pressed down and your hotbed is ready.

The hotbed should be made about two weeks before the seeds are sown. The sash should be raised a little every morning for ventilation, but not overdone in cold weather. To retain the heat the sash should be closed at night, and when it is extremely cold it is best to cover the beds with boards or old blankets to prevent the plants from becoming chilled. This precaution, however, is unnecessary when double glazed sash are used.

Bank the frame above ground with straw, manure, or other litter, with a little soil thrown over to hold in position.



THE LARGE FARM TOOLS

Comprising Reaping Machine, Manure Spreader, Motor Wagon, Hay Loader, Hay Press, Mowing Machine, Horse Rake



**WHEN
INJURIOUS**

FROSTS

**HOW
PREVENT**

Temperatures at Which Fruits Are Injured by Frost

The total damage wrought in the United States by the frosts of spring and fall runs into many millions of dollars. Naturally most of this is unavoidable, but a knowledge of the conditions governing frosts, and where possible the use of proper measures of protection, would reduce this sum materially and for the individual may easily mean the difference between profit and loss.

What Is Frost?

Frost, as we all commonly recognize it, is a condensation of moisture on plants in the shape of small ice crystals. Usually the air a short distance above the earth is several degrees above the freezing point at the time that frosts occur. The plants and the earth itself, however, radiate heat very rapidly after sunset and may reach a point where the surface is below the temperature of freezing. Immediately the moisture in the air is deposited on these surfaces in the form of ice crystals.

Location

In setting out to plant a given area, or in searching for a suitable piece of ground on which to place a given crop, the danger of frost should receive careful study. Many crops can stand heavy frosts. Naturally these may be raised in areas that are not particularly free from spring and fall frosts. Other crops which are especially tender should never be attempted except in suitable locations.

Any valley within the temperate zone that is more or less shut in at its lower end is likely to prove a settling point for cold air. On the other hand, hill-sides sufficiently elevated above such valleys are protected by the very fact that the cold air drains away from them and are likely to be comparatively free from damaging frosts. Due recognition of these two facts should be made in deciding what crop to grow or what land to choose.

Factors That Influence Frosts

It is everywhere recognized that clear, still nights are particularly apt to be frosty. The reason for this is easily found. Clouds serve as a blanket to the layer of atmosphere just above the earth and hold the heat. The radiation of heat from the earth and from plants goes on very much more slowly when the sky is overcast with clouds.

Winds tend to prevent frosts, because they stir up the air and keep it from forming in layers. If the air is kept constantly stirred by winds, the cold air next the earth will be mixed with the warmer air above and the freezing temperature at the surface of the earth will not be reached. Thus large fans, propelled by gasoline or electric power, may produce a breeze that will prevent frost.

Protection Against Frosts

Anything that will serve as a blanket to assist the earth and the plants to retain the heat they have absorbed during the day will tend to prevent frost. This blanket may be water vapor, a heavy cloud of smoke, or such artificial coverings as straw, boards, earth, etc. With low-growing plants like the strawberry, straw may be used to great advantage as a protection against frost. The value of one crop saved in this way will pay for the labor and cost many times over. Garden vegetables of tender varieties may often be protected by plowing so as to cover their tops with earth.

No practical means have yet been devised for protecting extensive areas of field crops such as potatoes from frost, but in vine and tree fruits, where the value of the crop is so much greater, protective measures may profitably be employed.

A common plan is to build fires or smudges at frequent intervals through an orchard, thereby creating a dense cloud of smoke, which hangs over the orchard and blankets it. These fires may be made of any suitable material that is at hand, or special orchard heaters may be purchased. Several makes are now on the market.

It is important that the fires be rather small in size and distributed at frequent intervals. This is because it is undesirable to create a heavy and strong draft such as a large fire gives rise to, since this draft will carry away to the upper atmosphere the heat and smoke that is needed next to the earth. Some orchardists have followed the plan of using

bags of manure to create a smudge. The manure is tightly packed into the bags and these are distributed through the orchard so as to be ready for use if needed. When frost threatens kerosene is poured on the bag and it is set on fire. It will burn slowly, giving off a dense smoke and adding moisture to the air, which will assist in forming an effective blanket.

Temperatures Injurious to Plants

The following table shows the temperatures at which the plants mentioned are liable to receive injury from frost. The temperatures are, as nearly as possible, those of the air in contact with the plant itself. Frost usually comes when the sky is clear, the wind dies down at sunset, and the air has a crisp, sharp feeling. Plants may often be saved if given very slight protection—a cover of cheese-cloth, branches of trees or even newspapers. In small sheltered gardens frost may sometimes be warded off by building a smudge fire or by placing shallow pans of water near the plants:

Plant or Fruit—	In Bud	In Blossom	In Fruit	At Other
Almonds	28	30	30	28
Apples	27	29	30	26
Apricots	30	31	32	30
Asparagus	29	29	29	26
Bananas	31	31	32	31
Barley	29			
Beans	31			
Beets				25
Cabbage				16-17
Cantaloupes	32	32	30	30
Cauliflower				20-27
Celery				28
Cucumbers	31	31	31	32
Cynidings or squash	31	31	31	30
Flowers	31	31	31	30
Grapes	31	31	30	28
Grape-fruit	30	31	31	28
Lemons	30	31	31	28
Lettuce				12-28
Mandarins	31	31	31	28
Oats	31			
Okra				31
Olives	30	31	31	24
Onions				20
Oranges	30	31	31	20
Paranips				27
Peaches	29	30	30	26
Pears	28	29	30	26
Peas	29	30	30	25
Plums	30	31	31	29
Potatoes: Irish	30	30	30	31
Potatoes: Sweet	31	31	31	31
Prunes	31	31	31	29
Radishes				25
Rhubs, trees, or roses	26-30	28-32		30-25
Spinach				21
Strawberries	28	28	28	30
Tangerines	31	31	31	28
Tomatoes	31	31	31	31
Turnips				26
Watermelons				20-31
Wheat				31
Walnuts, English	30	31	31	28

*Depends on variety.
†Injured at 2 higher if continued 4-6 hours.
‡Ripe. §Green.

Fruit-bearing Table

	Time to Bear, Years	Good Crop, Years	Length of Bearing Season, Years
Apple	4	10	25-30
Blackberry	1	3	6-14
Orange and Lemon	3	6	30
Current	1	3	10
Gooseberry	1	3	10
Peach	3	5	12
Pear	4	12	75
Quince	2	4	15
Raspberry	1	3	12
Plum	3	6	25
Strawberry	1	2	3

HOW NATURE PREPARES FOR SPRING

No Change in a Thousand Years

A. Edward Paschall, in *Farm and Garden News*

The rush and haste and hurry of spring work, when a score of things sometimes demand attention at once, can be avoided by imitating Nature.

Nature never hurries. The secret of her achievement is that she never halts. Springtime is merely one of her several annual culminations. Well-devised and long-pursued plans have produced their due results. It is like a play on the stage. The actors have been rehearsing for months and know their parts well. The curtain rises on a performance that is perfect in every detail. The scenery is fresh each season, though the plot is as old as the hills.

Nature begins her spring work just about twelve months in advance. No sooner are this year's leaves open than next year's buds begin to form. By August the axillary buds of the apple are mature and may be transferred by human agency to another tree. Leaf buds and fruit buds are alike formed and finished before the close of summer. Witch hazel opens its yellow flowers in October and November and perfects its seeds late the following summer.

Underground work is completed before the advent of winter. All the bulbs, corns, tubers, rootstocks, and suckers are developed and made ready for quick action when spring comes striding northward at the rate of thirteen miles a day.

The so-called weeds and wild flowers sow their seeds in autumn. The freezing of winter does not injure them. Indeed, the seeds of certain plants require freezing before they will germinate. Nature scatters the smaller seeds gently on the surface of the ground, to be covered with sand or loam by the action of rain, snow, or wind. The larger seeds must be placed deeper in the soil, and the work devolves upon squirrels, mice, and birds. Human beings, copying Nature's methods, have adopted the following rule: Plant seeds about four times their own diameter in the soil.

In winter the trees, shrubs, and herbs appear to be asleep, but in reality they are more or less awake and active, at least part of the time. The sap of trees begins to flow freely in February and March, with the increase of daylight.

Nature does a vast amount of effective manure-spreading in autumn, when she coats every field and forest with decaying organic matter, including leaves, dead grass, and the stems of weeds. The rain and snow compost this material and convert it into plant food.

In addition to this annual supply of organic plant food, there is a considerable amount of inorganic fertility separated each year from the rock particles of the soil. Nature employs frost and ice to lift, pinch, expand, and tear apart the upper layer of the earth, thus affecting the soil to a depth of five or more inches. Often the ground is pulverized as though stirred by harrow teeth. No small amounts of lime, potash, and phosphoric acid (called mineral fertilizers) are thus set free and made available. Freezing and thawing produce both mechanical and chemical results, just as summer cultivation of the soil produces results of two sorts.

At the close of winter, with long days and warm rains, Nature is ready with her moving pictures.

Her land has been fertilized, cultivated, seeded and rested, and everything set in order. Results are certain to be quick and spectacular. How can humanity compete with such conditions? There is going to be a sudden release of energy on a world-wide scale. How can the farmer hope to keep step with the rapid march of events?

The answer is simple. It is only needful to imitate Nature—that is, to be prepared. The secret is in beginning long in advance—a year, if need be. To work for tomorrow as well as for today, is called cumulative action. It gains force as it proceeds. Some people call it taking time by the forelock. A well-broken horse can be led by the forelock or tuft of hair growing above the forehead. Time, to be led by the forelock, must be under control. Thorough cultivation of the soil is cumulative in its effects. Nature's work is conspicuously cumulative, for she is ever making plans for the morrow. She hoards her resources and lives within her income.

Operations in field and garden can be hastened and valuable spring days saved by observing Nature's methods of preparing and applying plant food. Not only in autumn but at all seasons of the year. Immediate destruction of waste material is the rule. The old becomes the new. Death is at once followed by life.

Nobody has yet found a better place to store the natural manures than on the surface of the garden, lawn, or field. Some farmers follow the system of immediate disposal during the entire year, never permitting heaps to accumulate at the stables. When the ground is covered with snow they set up stakes to mark the area that has been top-dressed. People who oppose this plan speak of a loss of fertility by leaching when the ground is frozen, but those who practice it say that the waste is trifling as compared to any known method of storage and that the results are highly satisfactory.

It will be observed also (and this is not a stretch of the imagination) that Nature sharpens her tools during the so-called rest months of winter. There is a keen cutting edge on the frost and ice and even on the air and the sunshine of early spring though soft, is still suggestive of cold. Men's sharp tools make for haste and speed. Nature's sharp tools prevent hurry and check progress that would otherwise be too rapid.

Nature's working plans have not changed one iota in a thousand years. Her master plan is preparedness. Good farmers are those who are prepared. Preparedness enables workers to keep pace with their work and to push things instead of being pushed by things. This spring, therefore, is the time to get started on next spring's work.

Remember Nature's sequence: She made long in advance; continuous and cumulative work, entire preparedness without haste or hurry. It is not argued that a farmer's spring work can be done in advance of the season's arrival, but that it can be so planned and executed that there will be no need of worry or waste of energy.

Vine Spraying Calendar

The necessity of spraying is acknowledged by all authorities as being one of the requirements of successful fruit growing. Spraying not only insures better fruit, but more of it, greatly increasing its quality and value.

Grapes (Fungus diseases; Scale-beetle)

First application: In spring when buds swell, copper sulphate solution. Paris green for scale-beetle.

Second application: When leaves are 1 to 1½ inches in diameter, Bordeaux. Paris green for larvae of scale-beetle.

Third application: When flowers have fallen, Bordeaux. Paris green as before.

Fourth application: Ten to 14 days later, Bordeaux.

Currant (Mildew; worms)

First application: At first sight of worms, a centes.

Second application: Ten days later, heliobore. If leaves mildew, Bordeaux.

Third application: If worms persist, heliobore.

Gooseberry (Mildew; worms)

First application: When leaves expand, Bordeaux. For worms, as above.

Second application: Ten to 14 days later, Bordeaux. For worms, as above.

Raspberry, Blackberry, Dewberry (Anthracnose; rust)

First application: Before buds

break, copper sulphate solution. Cut out badly diseased canes.

Second application: During the summer, if rust appears on leaves, Bordeaux.

Third application: Repeat second, if necessary. (Orange or red rust is treated best by destroying entirely the affected plants.)

Strawberry (rust)

First application: As first fruits are setting, Bordeaux.

Second application: After last fruits are harvested, Bordeaux.

Spray materials are now sold by all leading seedsmen, drug and hardware stores, and are put up in concentrated form with full directions for use.

PECAN AND OTHER NUTS

NUTS

FACTS ABOUT NUT TREES

Conditions Favorable for Growing Nuts

Almonds

The almond is of the same family as the peach and the nectarine, and the cultivation is similar to that for those fruits. It is a native of Asia and northern Africa and flourishes in America in those regions where the olive thrives. The tree grows to about 20 feet in height, has delicate pinkish blossoms that appear before the leaves, which are a long oval, pointed, with delicate saw-toothed edges.

Chestnuts

The chestnut is profitably grown for market and as a shade tree makes a beautiful ornament. The native chestnut produces a comparatively small, but sweet-flavored nut, while the Spanish nut, introduced by the early Spaniards, has spread through the South and is larger, if coarser. A new species recently introduced from Japan, grows on tall shrubs, it makes a good hedge-row plant besides producing a profitable crop. The pounded chestnut paste is used in confectionery here but the nut has not yet become a staple article of diet as it is among the peasantry of Italy and Spain, though American epicures have learned to use chestnuts in stuffing roast poultry.

Pecan

In recent years the pecan has become a very important nut, particularly in the Southern States, and it may be said that there is no other fruit or nut tree which fits so well into the general farming of this region as the pecan. Cotton, corn, cowpeas, and other farm crops can be grown to advantage among the trees when they are young, and even until the trees have begun to bear well.

When Start a Pecan Orchard

The region in which the pecan may be grown, with a proper selection of varieties, extends from Virginia to Florida, thence west into Texas and Oklahoma. It is destined to become the most important horticultural tree in this whole region, and the pecan orchards of the South will rival the apple orchards of the North and Northwest. The pecan, under proper conditions, will continue to bear fruit long after other trees planted at the same time have ceased to grow; in fact, a pecan orchard is equal to many peach orchards—for instance, in length of life and fruitfulness. As shade trees they make handsome specimens, and they are well adapted for street, road, and yard planting.

How Plant Pecan Trees

Pecan trees should not be set closer than 40 feet apart each way, and from this distance up to 50 feet will be found about right for most soils. The best season for setting the trees is immediately after the leaves fall in autumn. December and January are good months, though the planting season may be continued through February or even March if there is good moisture in the soil. In planting, it will always be found best to set trees of good size, provided they are vigorous and thrifty. Preference should be given to trees of 4 to 5 and 5 to 7 feet grades, as they will give better satisfaction than smaller sizes.

The ground should be carefully staked out, a stake being set for each tree. The holes should be dug wide and deep. In planting the trees, set them at the same depth as they stood in the nursery rows. Pack the earth close and tight around the roots with the hands. The roots must be well covered with damp sacks or burlap to keep them from the sun and wind. Any broken roots should be cut back or cut off before planting. The tops of young trees need not be cut back, but trees grading 4 to 5 feet and up should have the tops cut.

How Soon Yield Crop

In six to eight years after planting, the trees will begin to bear light crops, and by ten years they should be yielding fairly well. A good fertilizer for young trees is one containing about 4 per cent nitrogen and 5 to 7 per cent each of phosphoric acid and potash. For bearing trees increase the potash to about 10 per cent. Stable manure and woodashes can also be used to advantage.

Walnuts

English Walnut or Persian Walnut, sometimes called the Madeira-nut tree, is a native of Persia, is beautiful as an ornamental tree and will grow as far north as New York but produces fruit only in the warmer sections of the country. As a profitable industry the raising of English walnuts is confined to about the same localities as the raisin grape. The tree has flourished in California for years.

In the development of the nut industry, the Japan walnut is well worthy of a place in every planting, and no home orchard should be without a few trees. They should be planted on well-drained land—a sandy or clay loam with a clay foundation is well adapted. The tree is a vigorous grower, and comes into bearing early. In habit of growth they are low and spreading, reaching a height of 15 or 20 feet, with a spread of branch of about the same distance. The leaves are large and handsome. The nuts are borne in clusters of fifteen to twenty. They have rather thick shells, with sweet, plump kernels of very fine quality. They make beautiful lawn or shade trees.

The black walnut is one of our most noteworthy native trees. At one time common throughout the whole of the Eastern and Central United States, it has become a comparatively rare tree in most parts of its native home. Its timber, highly prized for cabinet work, is more valuable than any other native timber. It is also coming into prominence as a stock on which to graft and bud the English or Persian walnut. The nuts, though thick-shelled, are rich, oily, and sweet. The trees grow to a large size with wide-spreading branches, making it a noticeable tree in any landscape. It is well worth planting for its nuts, for its timber, and for its beauty as an ornamental shade tree. It succeeds best on well-drained land, and should not be planted on wet soil.

Peanuts

The peanut plant is a "trailing annual," growing from 1 to 2 feet high, with pale green, hairy stems and spreading branches. It has the peculiar habit of maturing its fruit underground.

Two general varieties are known, the larger termed "Virginia hand-picked," and the smaller variety called Spanish. The former are generally sold for roasting and the latter used, shelled, for the manufacture of peanut butter, salted peanuts, the many candies, and the peanut oil of commerce, which is considered preferable to olive oil for table use, and is used also by watch-makers and others for delicate machinery.

A long, hot, moist summer, at least five months without frost, is demanded by the peanut, and to reach perfect condition it should have little rainfall at harvest time. It wants a well-balanced soil; too much humus makes an excessive growth of vine at the expense of the root, while if the soil is poor in lime, one will harvest only a crop of empty pods, in such case, a ton of quick-lime or three tons of marl may be applied to an acre with good results. Phosphoric acid and potash may be used liberally.

The peanut should follow a cultivated crop, as corn or cotton, and for the benefit of the peanut, stable manure should be applied to this previous crop. The Spanish peanut is recommended as a forage crop, being especially raised for swine. It should be harvested before frost, even if grown only for fodder.

Peanuts are sometimes planted in hills, so that they may be cultivated both ways; the usual way, however, is to plant them in furrows, 2 feet apart, dropping the seed by hand at distances of four inches to two feet apart in the row. Two bushels of seed in the pod will sow an acre. It is best to remove the pod before sowing the larger varieties, taking great care that the skin is not broken. Surface cultivation should be given to kill the weeds and also to let in the air and rain more freely to the roots.

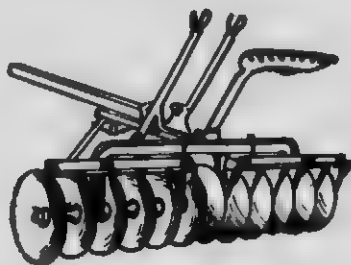
In harvesting, the tap-root should be cut, using a special plow adapted to this purpose, the vines may then be carefully lifted with pitchforks and later stacked around short poles, where they are left for perhaps a fortnight; the pods are then picked off by hand and placed in bags to be stored in dry, well-ventilated sheds.

TOOLS REQUIRED BY THE NEW SETTLERS

Iron Beam Plow to Break Ground, Followed by Subsoil and Other Tools Herewith Seen and Mentioned



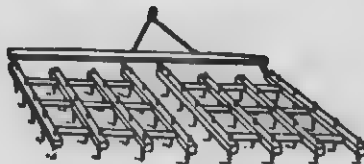
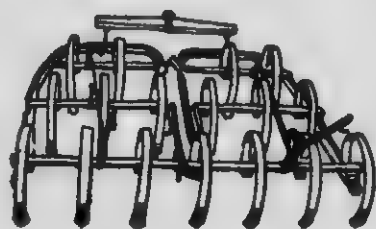
STEEL BEAM PLOW



Sub-soil Plow

By following the ~~flow~~ with a sub-soil plow the earth can be broken to a depth of from 15 to 20 inches, giving roots a wider range for food, and the plants are hardly affected by excessive drought or a wet season. as the deep soil absorbs all the rain like a sponge and gradually gives off moisture during dry, hot weather.

The "Lund Medal" involves new principles and accomplishes the work without throwing any sub-soil on top. Its merits are ease of penetration, light draft, superior pulverization of hard pan, perfection of the "mole track" effect. The one-horse plow will reach to a depth equal to the height of its standard—15 to 18 inches—and the two horse plow to the depth of 20 inches.



TOOLS FOR PREPARING SEED BED.

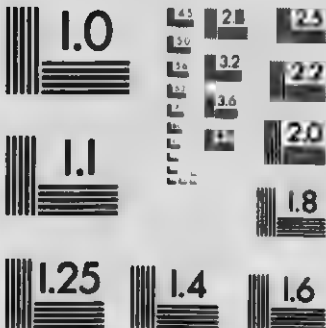
Common on many farms. Wooden drag, tubular roller, spring-tooth harrow, disk harrow, spring-tooth harrow.





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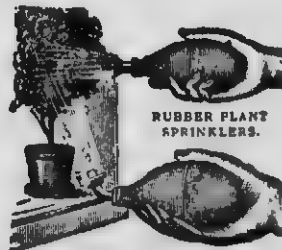
BILL HOOK.



BRUSH AXE.



GARDENER'S GLOVE.



RUBBER PLANT SPRINKLERS.



LIGHTNING DOUBLE-EDGE PRUNING SAW.



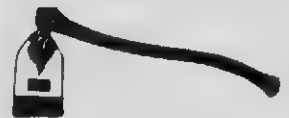
COMBINED PRUNING SAW AND CHISEL.



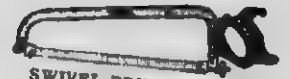
LITTLE GIANT PRUNER AND SAW COMBINED.



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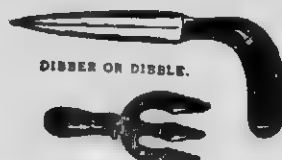


STEEL BOW RAKE.



CORN HUSKER.

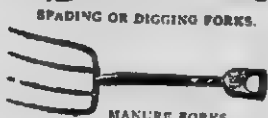
CORN BREAK.



DIBBER OR DIBBLE.



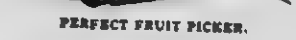
TRANSPLANTING FORKS.



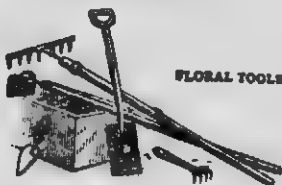
SPADING OR DIGGING FORKS.



MANURE FORKS.



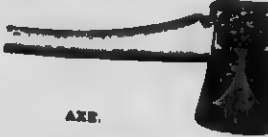
PERFECT FRUIT PICKER.



FLORAL TOOLS.



ASPARAGUS KNIVES.



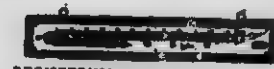
AXE.



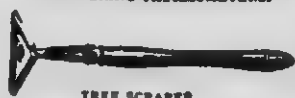
BASKET.



BUDDING AND PRUNING KNIVES.



REGISTERING THERMOMETERS.



TREE SCRAPER.



"SLIM JIM" TROWEL.



STEEL TROWEL.



HEART-SHAPED TROWEL.



VINE OR WALL NAILS.



WEEDER.



BURKHA WEEDEE.

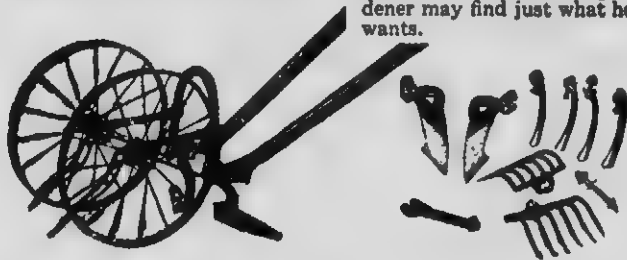


REELSTON WEEDEE.

Modern Improvement in Tools and Growth of Plants

The gardens of to-day with their long rows instead of beds, need up-to-date tools that will do all of the work with the least expenditure of time, labor and money. Here are 38 combinations, ranging in price from \$2.50 to \$12.00, that answer every need whether planting, cultivating, or distributing fertilizer. There are

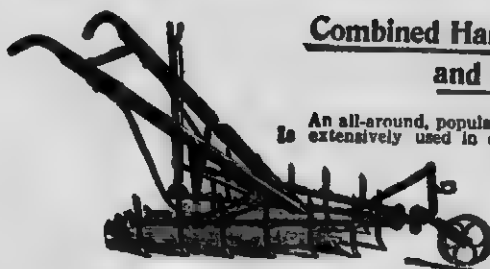
many attachments for special purposes so that each gardener may find just what he wants.



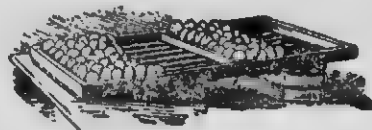
Combined Harrow and Cultivator.

An all-around, popular, adaptable tool is extensively used in cultivating sugar beets. Has diamond-shaped steel teeth with cultivator point forged on one end. They are adjustable for depth and

angle. With lever expander, cultivates 34 in. wide and closes to 11.



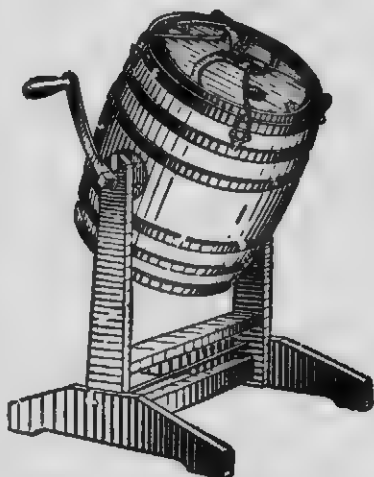
A Spike-Tooth Harrow with Lever Up. A Smoothing Harrow with Lever Down.



Tray partially filled with potatoes for sprouting.

Some of the Tools and Helps on the Farm

Churn, Cream Separator, Grapery, Chicken Coop, and Manure Spreader



This style of churn proves very satisfactory on the average farm



Cream Separator



Fig. 75.—GREENHOUSE OR GRAPERY.



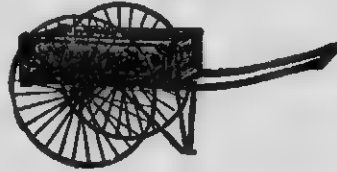
Chicken coop with inclosed and partly covered run.



KEMP'S MANURE SPREADER.

Implements Used on the Farm

HAND CARTS.



HUSKING PINS.



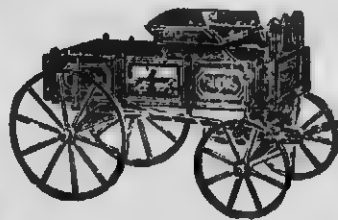
GRASS SHEARS.



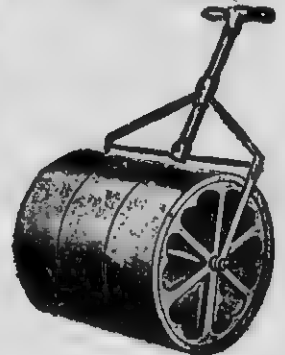
MILK PANS.



FARM WAGONS.



LAWN ROLLER.



HUSKING GLOVES.



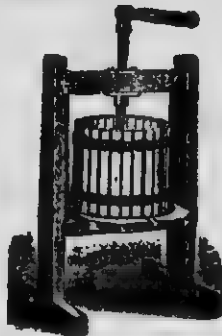
CORN SHELLERS.



POTATO PLANTERS.



WINE MILLS.



SEED SOWERS



BONE CUTTERS.



STORAGE OF FARM PRODUCTS

Community Interests Are Solving the Problem of Proper Care of Fruits, Vegetables and Grain—the Last Step Towards Putting the Farm on a Business Basis.

Proper storage, whether for fruits, vegetables or grain, is a topic of constantly growing importance to the farmer. Every year cold storage is being brought closer to the farm. The farmer knows its benefits; he knows that by means of refrigeration crops may be held till market conditions are right. He knows that the harvest time is not the proper season for realizing good prices for his produce, and he knows as well that someone is making an extra profit from holding the fruit that he has raised until the normal supply has been used and prices have gone up in consequence. Like other business men, he wants a fair return for his labor and investment, and through individual or community cold-storage plants he is beginning to see his way clear to accomplishing his object.

Of course only on large farms would an individual storage plant pay, except in the way of granaries, bins, silos, barns and cellars. Artificial refrigeration requires a fairly large output to overcome the cost of maintenance. But the community storage plant is easily feasible, as has been proved in the case of co-operative grain elevators, and in the shipping associations of fruit and vegetable growers in many parts of the country. The larger the organization, the greater the net profit, but even small communities raising a common crop can profitably adapt the scheme to their own use.

Co-operative Fruit Growers' Associations are now organized in nearly all Canadian fruit districts. Many associations have their own storage and pre-cooling plants from which they ship perishable fruits direct in refrigerator cars. Thus the picking, grading, packing, shipping and marketing of fruits is carried on in the most economical manner, making it possible to market Ontario strawberries in Western Canada or Niagara peaches in the British market. Marketing is carried on so as to avoid either a glut or a shortage. In many districts vegetable growers co-operate with the fruit growers.

Branch cold-storage plants are being installed in the smaller market towns as feeders for the big centers of consumption. Farmers are being encouraged to buy storage when the market price of farm products is too low to tempt selling. The commission man is hiring

Storage of Farm Products—Continued

out his services as an expert in the storage of fruit, selling storage to the farmer who wants to take his own chances on the market.

There was a time, not so many years ago, when the average farmer raised only fruit for home use. The surplus was sold when ripe—if at all—at ridiculous prices, or left to rot on the ground. Apples brought twenty to fifty cents the bushel direct from the orchard; by the holidays the price was out of sight and few to be bought at any price. That was before the day of commercial refrigeration. Now the situation has changed. Prices continue to be low when the crop matures; prices soar through the winter; but apples are nevertheless plentiful. The profit goes to the man who takes the risk—the commission man who has a storage plant to conserve the fruit till market conditions are right.

But conditions are again changing. Everywhere farmers are beginning to demand their fair share of the profits, willing at the same time to bear their fair share of the risk. A number of circumstances have made the new condition possible. New and economical methods of refrigeration—smaller and cheaper plants nearer the farm or on it. Easier and cheaper means of distribution. The parcel post system is making an easy path direct from producer to consumer, and the express companies are offering like inducements. It is now profitable to ship in smaller and smaller quantities. The small fruits, eggs, butter, vegetables, etc., find a ready market in the city, transported at a rate that leaves a margin.

But for the larger fruits, the parcel post or express shipment is not so practical. Moreover, the harvest season comes but once, while the demand continues the year round, prices improving steadily out of season. The longer the farmer is able to hold his fruit, the better his profit. In progressive communities associations are being formed to install storage plants, refrigeration centers, sales agencies. An expert is put in charge, the expenses being taken care of pro rata. The local manager is in touch with markets, prices, the condition of the produce. His employers realize a good profit on his services.

But the members of the association must know something about the storing of fruit so that it may reach the plant in condition best adapted for long keeping. A few directions along this line may prove of value.

Apples, Pears, Peaches. These fruits usually should be fully grown and highly colored to give the best keeping and commercial qualities. Appearance counts a great deal in determining price, but

Storage of Farm Products—Continued

fruit will stay sound longer and be freer from scald and rot if thoroughly ripe. However, fruit from rapidly growing young trees is likely to be overgrown and often needs picking earlier. Picking over the trees several times may be necessary to get uniformity, but it pays. It pays to grade fruit according to size, color and quality. Imperfect fruit rots more quickly and soon contaminates the rest. Bruised fruit should be sorted out.

The fruit should be stored as quickly as possible after picking. The ripening which takes place between picking and storage shortens the life of the fruit, especially if the weather is hot. In the storage plant the fruit should be kept at a temperature of 31 to 32 degrees. Wrapping the fruit holds the color and prevents wilting and bruising. Keeping the fruit closely packed in closed boxes or barrels helps; ventilation hastens rot.

Small Fruit. As a rule small fruit, berries, etc., are not held in cold storage more than a few days. For this purpose a temperature of 36 to 40 degrees is satisfactory. To keep for any great length of time the fruit must be thoroughly frozen. It is well to remember that such fruit rapidly deteriorates after being removed from refrigeration, and that the best results are obtained when the fruit is merely cooled for quick sale. Small fruit that is carefully sorted and graded finds better and easier sale. Bruising of fruit is minimized by making the commercial package as small as possible.

As a rule, berries, currants, cherries, etc., should be picked when well matured and fully colored, but while still firm. The same conditions hold true regarding grapes, cranberries, the smaller plums, etc.

Pre-cooling of Fruit. In order to assist the shipper, pre-cooling plants have been established at nearly all large shipping stations, so that the fruit may be cooled before packing. After being placed in crates or boxes or barrels, the cooling is necessarily very slow, and much deterioration may result before the car refrigeration is complete enough to arrest it. It cannot be too strongly emphasized that reduced temperature is necessary for the proper keeping of perishable products, even when fruit is separately wrapped, packed in sawdust, or otherwise protected, and the initial cooling is a very essential part of the process. Packed fruit will stay warm or will stay cool a long time.

Vegetables. As a rule vegetables are not so delicate and there is much better chance of reviving wilted shipments. Many of the coarser vegetables, too—potatoes, turnips, squashes, pumpkins, etc., unless

Storage of Farm Products—Continued

designed for long keeping, do not require any extra precautions save protection from bruising, freezing and dampness. Of these the last is especially important. Potatoes should be thoroughly dry before being packed for shipping; any care in the way of cleaning, sorting, etc., pays in higher price per bushel.

Fresh vegetables as a rule should be packed closely, where possible, with roots or tops left on. Lettuce keeps better where not trimmed too closely, although properly bleached head lettuce brings a higher price when trimmed. Bunch stuff sells more easily and brings better prices than bulk, but requires more careful handling and a readier market. Pod peas and beans should be boxed in commercial quantities—the less any vegetable is handled the better its appearance and condition.

Grains. No farmer needs instruction in the storing of grain, and the method of shipping is familiar enough. The grain should be thoroughly ripe, thoroughly dry, and should be kept in a place not subject to great variations of temperature and away from all dampness. Proper ventilation is necessary, but water is the greatest grain enemy. Most of the grain of the country is now stored in elevators, one or more being located in or near every grain-producing community. Many of these elevators are co-operative in their nature, the expense being borne proportionately. As a rule, the farmer stores on his farm only his stock food and seeding grain.

Co-operation in the handling and sale of fruit, vegetables and grain. Inasmuch as under the mixed-crop system few farmers raise enough of any one kind of fruit or vegetable to make an individual refrigeration plant very profitable, co-operative organizations are coming into favor. Occasionally it is cheaper to use the branch commission house for this purpose when the amount shipped at any one time is small. Only when the agriculture of a community is of one kind would any extensive plant pay. But in the grape districts, the apple regions, the peach and pear and truck-farming regions, such an organization meets a real need. Some of the benefits derived are quickly apparent to the farmer whose fruit has barely paid hauling expenses because of poor condition on arrival. Car-lot shipments of perfectly kept produce are cheaper to handle and bring better prices. Such an association, too, has a tendency to improve the quality of the fruit and vegetables offered for sale, and it certainly enables the farmer to realize his fair share of the profits derived from holding his crop for advantageous market conditions.

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es the
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D	
Dahlia	116
Dandelion	109
Datura	116
Department of Agriculture.....	68-73
Experimental Farms.....	68
Free Bulletins.....	69
Dewberries	246
Dianthus	116
Disc Harrow	262
Dogs, Varieties of.....	210-213
Alredale Terrier.....	213
Basset Hound.....	211
Bergie	212

Subject	Page
Java	193
Lakenvelders	193
Langshans	193
La Fleche	194
Leghorns	194
Malays	194
Minorcas	194
Orpingtons	195
Plymouth Rocks	195
Polish	196
Redcaps	196
Rhode Island Reds	196
Spanish	197
Sultans	197
Wyandottes	197
Prince Edward Island	11
Area	11
Capital	11
Climate and Rainfall	11
Cost of Land	12
Fruits, Varieties best adapted	12
Grains, Varieties best adapted	11
History	11
Location and Extent	11
Population	11
Towns	11
Primrose	120
Primula	120
Pumpkins	111
Pyrethrum	120

Q

Quebec	25
Area	28
Capital	28
Climate	29
Fruits, Varieties best adapted	20
Grains, Varieties best adapted	20
History	28
Land, Available for Settlement	80
Population	28
Schools	80
Towns	25

R

Rabbits, Varieties of	214-215
Radish	111
Raspberries	246
Rhubarb	112
Rice	224
Ricinus	120
Rockery	156
Roselle	247
Roses	120
Rutabagas	112
Rye Growing	222

S

Subject	Page
Sainfoin	266
Salpiglossis	120
Salsify	112
Salvia	120
Saponaria	120
Saskatchewan	47
Agricultural Bulletins	50
Area	47
Capital	47
Climate	48
History	47
Lumbering	49
Population	47
Root Crops	49
Schools	50
Stock Raising	49
Towns	47
Scarlet Runner	121
Schizanthus	121
Seed, Quantity Required for an Acre	88
Seeds, Vitality of	88
Sensitive Plant	121
Settlers' Twelve Commandments	56
Sheep, Breeds of	176-180
Black-Faced	180
Cheviot	178
Cotswold	178
Crossing Breeds	176
Dorset	179
Fat-Tailed	179
Feeding and Care	176
Leicester	178
Lincoln	179
Merino	179
Oxford Down	178
Shropshire	180
Southdown	180
Stiles	228, 229
Advantages	229
How to Build	228
Mixture of Grain	229
Stilage Required	229
Soil Moisture	84
Sorghum	224
Soy Beans	48
Squabs	208
Care of	204
Squash	112
Stock	121
Stock Food Values	261
Storage of Farm Products	277-280
Apples	278
Grains	280
Peaches	278
Pears	278
Pre-cooling	279
Small Fruit	279
Vegetables	279

Subject	Page
Strawberry Culture	248, 249
Sunflower	121, 248
Surinam Cherry	247
Swans	214
Sweet Peas	121
Sweet Rocket	121
Sweet William	121
Swine, Breeds of	182
Berkshire	182
Cheshire	182
Chinese	182
Chester White	182
Essex	182
Jersey Red	182
Poland-China	182
Suffolk	182
White Yorkshire	182
Yorkshire	182

T

Technical Terms Defined	268
Thrip	266
Thunbergia Alata	121
Tobacco Growing	222
Tomatoes	112
Turkeys	202, 208
Breeds Recommended	202
Care of	208
Hatching	208
Turnips	112

V

Verbena	121
Violets	121
Vegetable Garden	90
Commercial Fertilizers	91
Drainage	90
Drains, Best Material for	90
Dry Farming	91
Humus	90
Manures	91
Moisture	90
Sowing Facts	92
Vegetable Spraying Calendar	63
Asparagus	64
Beans	63
Cabbage	64
Celery	64
Potato	64
Tomato	64

W

Wall Flower	121
Water Melon	113
Weights and Measures, Table of	282
Wheat Growing	220

Z

Zinnia	121
--------	-----

Page	Subject	Page	Subject	Page
	Cheviot Sheep.....	178	Floral Tools	273
273	Chicken, Just Hatched.....	189	Flower Gathering Scissors.....	272
271	Chicken Coop.....	275	Flowers in Color.....	125-152
274	Chickens With Mothers.....	186	Fountain, Ornamental.....	158
160	Chinese Crested Dog.....	211	Fowl, Colony Houses.....	201
241	Chinese Hog.....	182	Frizzle Fowls.....	195
213	Churn, Favorite.....	275	Front View Cattle.....	172
215	Claw Hammer.....	272	Fruit Picker.....	273

Banket	273
Bassett Hound.....	211
Beagle Dog.....	212
Beautified by Trees.....	138
Bedlington Terrier.....	213
Beef Cattle, Points.....	172
Bees in Open Field.....	219
Belgian Hare Rabbit.....	215
Berkshire Hog.....	181
Bill Hook.....	272
Blackberries	242
Black and Tan Terrier.....	213
Black Faced Sheep.....	180
Black Retriever.....	212
Black Spanish Fowls.....	180
Blenheim Spaniel.....	212
Bloodhound	210
Bone Cutter.....	276
Botanical Show Grounds.....	160
Bronze Turkey.....	202
Brown Leghorn Fowl.....	195
Brown Tabby Cat.....	214
Bryanopsis	180
Bryophyllum.....	157
Brush Axe.....	272
Bulldog	211
Bull Terrier.....	213

Caladium	150
Canada Thistles.....	250
Carrier Pigeon.....	215
Cattle, Devon Breed.....	169
Cattle Points, Describing.....	172
Cattle, Showing Hips.....	172
Cattle, Model Horned.....	169
Celery Hoe.....	273
Cheshire Hog.....	183
Chester White Hog.....	181

Dachshund Dog.....	211
Dairy Points, Cow.....	173
Dalmatian Dog.....	211
Dandy Dinnot Terrier.....	213
Dark Brahmas.....	190
Dark Wing Game.....	193
Deer Hound.....	210
Depot Grounds Beautified.....	157
Dibber or Dibble.....	273
Digging Forks.....	273
Dorking Fowls.....	192
Draw Hoe.....	273
Drop Eared Terrier.....	211
Dutch Rabbit.....	215

Ears, Champion Corn.....	221
Elaborate Suburban Residence.....	157
Elm Tree.....	235
English Fox Hound.....	210
English Mastiff.....	210
English Pouter Pigeon.....	214
English Setter Dog.....	212
Essex Hog.....	181
Eureka Weeder.....	278
Excelsior Weeder.....	278

Fan-Tail Pigeon	215
Farm Wagon	276
Fat Tailed Sheep.....	179
Fences Removed, Effect.....	159

Galloway Cow.....	171
Garden Line.....	273
Gardeners' Gloves.....	272
Gold Spangled Hamburg.....	193
Gooseberries.....	242
Gourds.....	160
Grape Thinning Scissors.....	272
Grass Shears.....	272
Grass Shears.....	278
Gray Talking Parrot.....	214
Greenhouse and Grapery.....	275
Greyhound.....	211
Grub Hoe.....	272
Guinea Fowl.....	214

Hamiltonian Horse.....	163
Hand-Cart	276
Harrier Dog	211
Harrow and Cultivator.....	274
Harvest Field.....	220
Hatching Chickens.....	185
Hatching by Incubator.....	187
Hatchets	273
Hay Knife.....	273
Hay Loader.....	261
Hay Press	267
Hazeltine's Weeder	272
Heart Shaped Trowel.....	273
Hereford Cow.....	171
Hillside, Ornamented	155
Himalayan Rabbit.....	215
Holderness Cow.....	170
Holstein Cow	170
Hotbed	267
Horses, 12 Breeds.....	163
Houdan Fowl.....	195
Husking Gloves.....	276
Husking Pins.....	276

Incubator	188
Inferior, Superior Corn	266
Irish Potatoes	230
Irish Terrier	213
Irish Water Spaniel	212
Iron Beam Plow	271
Italian Greyhound Dog	211

Subject	Page
Jacobin Pigeon	215
Japanese Bantams	194
Jersey Cow	169
Jersey Red Hog	181
Johnson's Amaryllis	190
Judging Dairy Cattle	178

K

King Charles Spaniel	312
Kitchen Grindstone	272

L

La Fleche Fowl	190
Landscape View, 5 Acres	153
Langshan Fowl	194
Lantern	276
Lats Pigeon	215
Lawn Mower	272
Lawn Roller	276
Leghorn Runt Pigeon	214
Leicester Sheep	178
Light Brahma Fowls	190
Lincoln Sheep	170
Lop Eared Rabbit	214
Lopping Shears	273

M

Maltese Dog	211
Manure Fork	273
Manure Spreader	275
Manure Spreader Wagon	267
Market Name, Cattle	174
Merino Sheep	179
Milk Pan	276
Model Polled Cow	170
Morgan Horse	163
Motor Wagon	267
Mowing Machine	267
Mule	163
Mustang	163

N

Newfoundland Dog	210
Niagara Grapes	241
North America, Map	74
Nosebag Abolished	255
Nun Pigeon	215

O

Oil-Can	272
Open View Cottage	153
Otter Hound	211
Oxford Down Sheep	178

P

Park View, Washington	161
Partridge Cochon Fowl	194
Peacock	214
Percheron Horse	163

Subject	Page
Persian Cat	214
Pheasant	215
Pointer Dog	212
Points of Fowl	189
Points of the Horse	166
Poland China Hog	181
Pomeranian Dog	210
Poodle Dog	211
Potatoes, How Sprout	274
Potato Hooks	273
Possibilities, Crop, 1 Acre	153
Post Hole Spade	272
Poultry House	184
Prick Eared Terrier	213
Pruner and Saw	272
Pruning Saw	272
Pruning Saw Chisel	272
Pug Dog	210

R

Reaper and Binder	261
Reaping Machine	267
Rear Yard Improved	156
Red Pile Game	191
Rockery	156
Rouen Ducks	198
Rough Fox Terrier	213
Rough St. Bernard	210
Round Point Shovel	272
Rubber Plant Sprinkler	272
Running Horse	163
Rustic Bridges	157

S

Scoop Shovel	272
Scotch Terrier	212
Sebright Bantam Fowls	192
Seed Sower	276
Shetland Pony	163
Side View, Cattle	172
Short Horn Heifer	171
Shropshire Sheep	180
Shrubs, Large Display	155
Silo on Farm	228
Silky Fowl	193
Silver Spangled Fowls	183
Silver Gray Rabbit	214
Slim Jim Trowel	273
Smooth Fox Terrier	213
Smooth St. Bernard	210
South Down Sheep	180
Spangled Poland Fowl	195
Spike Tooth Harrow	271
Spraying Fruit Orchard	236
Spraying Potato Field	237
Spring Tooth Harrow	211
Squabs	237
Square Point Shovel	272
Square Point Spade	272
Steel Bow Rake	273

Subject	Page
Steel Garden Rake	273
Steel Trowel	273
Strawberry	243
Stream for Ducks	199
Subsoil Plow	271
Sutolk Hog	181
Sussex Spaniel	212
Swan, Water Fowl	214
Sweet Potatoes	230
Swivel Pruning Saw	272
Syringe No. 10	272

T

Texas Steer	169
Thermometer Registering	273
Thomas Circle, Washington	159
Thoroughbred English Horse	163
Tomato Vine Support	272
Toulouse Geese	198
Transplanting Forks	273
Tree Digging Spade	272
Tree Scraper	273
Truffle Dog	213
Trumpeter Pigeon	215
Tubular Roller	271
Turkey, Bronze	202

V

Vases, Flower	153
Vegetable Scoop	272
Vegetables in Colors	97-100
Vine Covered Cottage	153
Vine Nails	273

W

Watch Dog	210
Watering Pot	272
Wavy Coated Retriever	212
Wedge	273
White Cochon Fowls	192
White Crested Fowl	192
White English Terrier	213
White Fowls	188
White House Grounds	155
White Leghorn Fowls	191
White Pekin Ducks	200
White Yorkshire Hog	182
Wilderness Beautified	161
Winding Pathway	156
Winding Pathway Effect	160
Wine Mill	276
Wire Cutter	272
Wooden Drag	271
Wooden Grain Scoop	272
Wooden Water Pall	272
Workmen's Garden Hoe	274
Wyandotte Fowl	194

Y

Yorkshire Hog	182
Yorkshire Terrier	212
Young Fowls	185

Page
.....273
.....273
.....248
.....199
.....271
.....181
.....213
.....214
.....230
.....272
.....272

....169
....273
n...159
...163
....272
....198
....273
....272
....273
....213
....215
....271
....202

....153
....272
97-10
....153
....273

....210
....272
....212
....273
....192
....192
....213
....188
....155
....191
....200
....182
....161
....156
....160
....276
....272
....271
....272
....272
....274
....194

....182
....212
....185